

Asus M2A-VM

Shuttle XPC 1337 SDXi

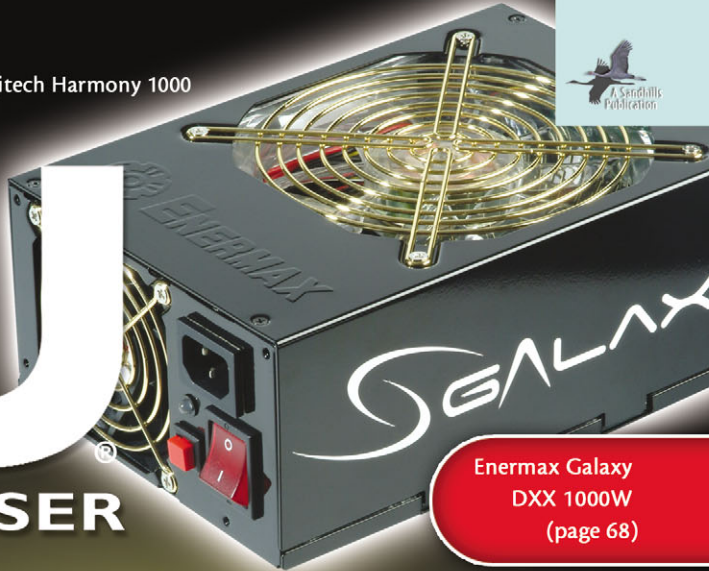
Bigfoot Networks Killer K1

Logitech Harmony 1000



cpu

COMPUTER POWER USER



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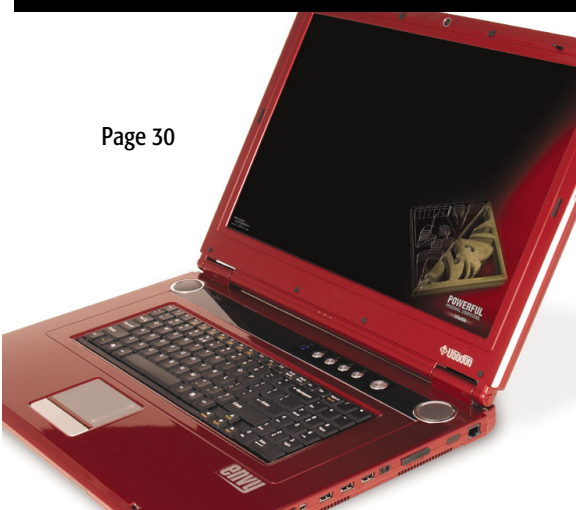


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EDITOR'S NOTE

Most power users know that making a quality PSU the cornerstone of a new PC build is a good idea; we don't take them for granted the way the general computer-using populace does. But strike up a conversation with a PSU manufacturer's rep (or an electrical engineer) sometime and you may be astonished at how little you actually know about them. And even if you're an astute power supply shopper, there's quite a bit that goes on in the industry that you're probably not aware of.

We spend quite a bit of time and space reporting on the competition between the big CPU and GPU companies, and those rivalries are huge, to be sure, but the PSU folks have similar grudges, gripes, and aspirations. I bring this up not because we are working on a huge exposé of the seamy underbelly of the PSU market or anything—I'm not even saying it has a seamy underbelly. I'm simply saying that just because PSUs aren't quite as sexy as the latest quad-core chips or high-end graphics cards doesn't mean that they aren't every bit as interesting from a technical standpoint.

That's why we decided to spend a few pages this month talking about what goes on under the shiny metal cases of today's PC power supply units, as well as reviewing a number of them with varying output levels. You can check that out starting on page 58.

Elsewhere this month, you'll find some interesting info on the One Laptop per Child project (pages 54 and 108) and HTPC cases and builds (pages 20 and 38), as well as several pages of coverage on our recent visit to the excellent PDXLAN event in Portland, Ore. The winner of *CPU*'s PDXLAN case-modding contest graces this month's cover, and although I'm not generally given to acute PC envy, Overkill is one machine I would dearly love to have stuffed in my carry-on bag for the flight home. Mad props to Dennis "DeadGuy" Leach for one of the coolest custom PC builds (if not the coolest) we've seen to date.

So kick back and enjoy, and let us know what you think.



Chris Trumble, Publication Editor, *CPU*



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P.O. Box 82667

Lincoln, NE 68501-2667

Hours

Mon. - Fri.: 7 a.m. to 8 p.m. (CST)

Sat.: 8 a.m. to 4 p.m. (CST)

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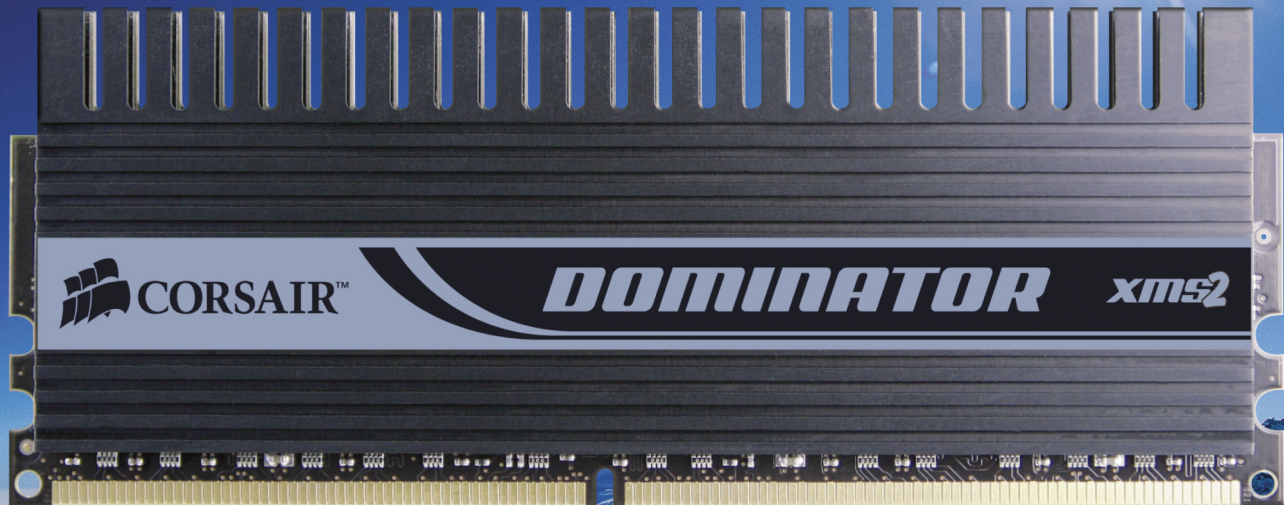
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Gotcha.
Here it is.



Cool Performance



HOW CORSAIR MAINTAINS TECHNOLOGY LEADERSHIP



INNOVATION
PERFORMANCE
RELIABILITY

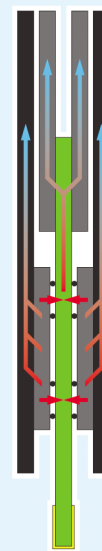
Here's the latest in Corsair's ten year heritage of innovation in performance memory: we've redefined memory heat sink technology. And the result is unprecedented performance and reliability. When we ran a preview module through system benchmarks at COMPUTEX, an overclocked DHX module with our optional airflow fan was able to hit a heart-stopping 1250MHz (PC-10,000) while maintaining cool, reliable performance.

Protect Components While You Push Performance

Pushing performance specs generates heat, and that can compromise reliability and component life. The advanced cooling ability of DHX heat sinks keeps your memory safe and reliable even as you push it to the limit. Under the name XMS2 Dominator, this DHX technology will be showing up on both Corsair parts designed for extreme overclocking and on memory designed for performance computing and gaming.

Also Featuring Enhanced Performance Profiles (EPP)

As with all new Corsair performance memory, XMS2 Dominator modules feature EPP, the new open standard for the Serial Presence Detect (SPD) jointly developed by NVIDIA and Corsair. EPP simplifies overclocking for beginners and provides unparalleled control for experts.



An optional fan (not shown) provides even more cooling and protection.



Corsair's proprietary DHX technology dissipates heat two ways: it draws heat away from the module through the RAMs and provides an additional path for heat transfer within the module through the ground plane!

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Seagate Gets Protective

Storage king Seagate gave ASI Computer Technologies the honor of being the first notebook maker to use the company's new Momentus 5400 FDE.2 (Full Disk Encryption), a 2.5-inch, 128-bit AES-protected SATA drive reaching up to 160GB. By putting encryption technology directly on the drive, would-be snoops even hoping to boot the notebook, let alone access drive-based data, must first provide authentication. ASI is offering the drive in a C8015 whitebook model, which should now be available. (Pricing wasn't available at press time.) The C8015 also includes a biometric fingerprint reader and bundles Wave System's security management software. Seagate includes its own DriveTrust technology for cryptographically erasing data when necessary. Unfortunately, for as many legitimate security advantages as the Momentus offers, creeps everywhere will likely use the drive for less-admirable purposes. (Momentus 5400 FDE pictured.) ▲



D-SLR-Level Photography On The Cheap

Aspiring photography buffs, take notice: That out-of-your-ballpark D-SLR digicam you've been, uh, focusing on for months but can't afford may just find its way into your hands soon enough, and for the low price of a far more limited point-and-shoot model. This according to Chris Chute, IDC analyst. If you haven't noticed, Canon, Nikon, Olympus, and other camera makers have already begun the movement toward offering more affordable D-SLRs in recent months by releasing models priced around \$600 and \$800. Chute says, however, discounters will drive pricing down further to an almost unbelievable \$299 range by late 2007. Smile and say cheese, indeed. ▲



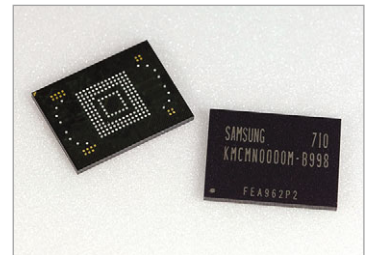
Philips Wants To Enhance Second Lifers', Er, Lives

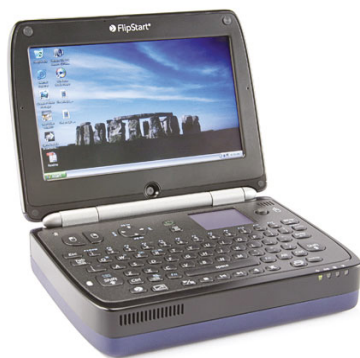
If you're one of the estimated 4.2 million-plus residents taking in the scenery in Second Life, Philips wants to enhance your virtual existence through such real-world sensory surround effects as lighting, flowing air, and rumble, "all tuned to events within the virtual world." How? With the company's amBX (ambient experiences) technology, of course. Philips is licensing the technology to Rivers Run Red to produce amBX-enabled environments that use light, color, heat, audio, and air movement via enabled devices, including Philips' amBX gaming peripherals. For really adventurous Second Lifers, Philips plans to create an SDK to create your own effects. In related news, Philips has inked an exclusive three-year hardware sponsorship deal with the WCG (World Cyber Games) to supply amBX competition hardware. Philips will also sponsor a new WCG Philips amBX Cup Challenge. ▲



Samsung Mixes Things Up

Continuing with the hard drive theme, Samsung has begun shipping its MH80 series of hybrid drives in 80GB, 120GB, and 160GB sizes. The 2.5-inch drives come with 128MB or 256MB of flash memory; Microsoft's ReadyDrive technology for Vista optimization; and Samsung's ReadyBoot technology, which the company says provides up to 50% reductions in boot and resume times over magnetic technologies while consuming 70 to 90% less power than traditional drives, thus extending battery life by 30 minutes. In related news, Samsung also recently began shipping 8GB flash memory moviNAND chips, which it says can store up to 2,000 songs on mobile phones. The chips will use the MMC interface and reportedly can process 52MB of data per second. ▲





Paul Allen Finally Flips For The FlipStart

We'd really like to nibble on the bait Paul Allen and his FlipStart Labs gang is dangling on a hook in front of us in the form of the company's new Vulcan FlipStart "super compact PC," but at nearly \$2,000, we'll stick with worms for now. Still, the FlipStart offers a 5.6-inch screen (1,024 x 600 max), 30GB hard drive, 1.1GHz Pentium M, 512MB memory, Wi-Fi and Bluetooth connectivity, and Windows XP Pro or Vista Business in a 1.75-pound, 1.6-inch thick body that's roughly paperback-sized. Further, the FlipStart includes a built-in VGA digicam, full QWERTY keyboard (albeit small), and cool InfoPane LCD that resides on the case's exterior for viewing email, calendar, and contact info. Reel back in, try a different bait, and we might think about biting, Mr. Allen. ▲

Hardware Mole

AMD Cracks The Top 10

Market research firm iSuppli gave AMD fanboys some good news to crow about last month when it reported the chipmaker jumped from the 15th slot in the world rankings of processor makers (based on revenue) in 2005 all the way up to the seventh position in 2006. OK, so the acquisition of ATI had a little something to do with the significant leap, but AMD (2.9% market share) still managed to increase its revenue by 90.7%. Intel (12.1% market share) managed to hold on to the top spot despite its 2006 revenue falling off 11.6% from 2005, iSuppli reported. Samsung (7.4% share), Texas Instruments (5% share), Toshiba (3.9% share), and STMicroelectronics (3.8% share) rounded out the top five. ▲

Mustek Discovers The Key To Storing Photos

A lot of USB flash drives let you carry around a portion of your digital photo library these days in unique styles. Recently joining the list is Mustek's KeyFoto Digital Picture Keychain, which, if you weren't paying attention, doubles as a keychain. The drive offers just 4MB of memory (about 42 photos), and its external 1-inch screen (reportedly the world's smallest OLED) offers just a 96 x 64 resolution. Still, that's pretty much in line with the \$29.99 Mustek is asking. The KeyFoto's internal battery is good for up to two hours of viewing, and it shuts off automatically after two minutes of inactivity. Additionally, you can browse shots manually or in slideshow mode. Now, if you'll excuse us, we seem to have misplaced the thing again. ▲



How Popular Is The Wii?

Despite the console having not even been officially released yet in China, various reports online indicate modifications through such mod chips as Wiinja, CycloWiz, and WiiKey to consoles imported into the country is so great, users can obtain modification goodness for about \$30. Meanwhile, other reports state that although mod chips used in first-generation Wiis work fine, some mod chips won't work at all with Wiis produced later that use the Panasonic D2B chipset. TeamCyclops, maker of CycloWiz, however, reports on its site that it has chips available "with D2B chipset support for people who have a D2B console and a CycloWiz from the first batch, which doesn't support D2B chipset." ▲



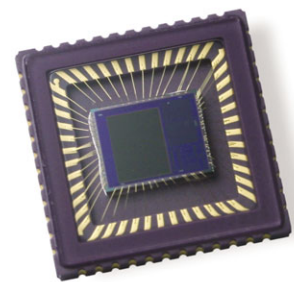
Intel Launches Flash Memory Chips To Replace Hard Drives

Intel has high hopes that flash memory chips will be able to replace hard drives in several computer and consumer applications. The company has announced its Z-U130 VSSDs (Value Solid State Drives) that will provide cheap and high-performance storage. The product comes in 1GB, 2GB, and 4GB densities (an 8GB version should be available in December). Intel says the NAND flash drives can read data at 28MBps and write data at 20MBps, which is fast enough to store boot code, operating systems, and commonly accessed libraries. The drives are USB 2.0 and 1.1 compliant and have a MTBF of 5 million hours. The Z-U130 drives are also small enough—weighing in at about 10 grams—for manufacturers to use in many emerging market devices such as handheld PCs or computers for developing countries. ▲

Cypress Semiconductor Says WirelessUSB Catching On

With so many wired products in their homes, users are starting to untangle the mess in their electronics systems by adopting WirelessUSB gear. Cypress Semiconductor says it has secured more than 175 design wins for its

WirelessUSB LP radio chips in less than one year. In that same time frame, Cypress has sold more than 2 million of the CYRF6936 WirelessUSB radio chips. Products that use Cypress' WirelessUSB chips include computer mice, keyboards, gaming controllers, VoIP headsets, toys, medical appliances, and more. Cypress says the CYRF6936 has AgileHID and DSSS (Direct Sequence Spread Spectrum) technology, meaning it has a built-in agility that lets the chip adapt to a different part of the 2.4GHz wireless spectrum if it encounters interference. That's particularly important in households that have a lot of wireless devices. ▲



Watching The Chips Fall

Here is pricing information for AMD and Intel CPUs.

*Retail price
** Manufacturer's price per 1,000 units
Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

CPU	Released	Original price	Last month's price	Current price
AMD Athlon 64 X2 Dual-Core 4800+ energy efficient	5/16/2006	\$671**	\$499	\$499
AMD Athlon 64 X2 Dual-Core 4800+	5/31/2005	\$1,001**	\$499	\$499
AMD Athlon 64 X2 Dual-Core 5000+ AM2 only	5/23/2006	\$696**	\$215	\$235
AMD Athlon 64 X2 Dual-Core 5200+ AM2 only	9/6/2006	\$827**	\$229	\$252
AMD Athlon 64 X2 Dual-Core 5400+ AM2 only	12/12/2006	\$485**	\$495	\$495
AMD Athlon 64 X2 Dual-Core 5600+ AM2 only	12/12/2006	\$505**	\$335	\$325
AMD Athlon 64 X2 Dual-Core 6000+ AM2 only	2/20/2007	\$464**	N/A	\$449
AMD Athlon 64 FX-62	5/23/2006	\$1,031**	\$550	\$394
AMD Athlon 64 FX-70	11/30/2006	\$599/pair	\$304/pair	\$299/pair
AMD Athlon 64 FX-72	11/30/2006	\$799/pair	\$417/pair	\$405/pair
AMD Athlon 64 FX-74	11/30/2006	\$999/pair	\$520/pair	\$515/pair
Intel Pentium 4 661 3.6GHz 2MB cache 800MHz FSB 65nm	12/27/2005	\$401**	\$169	\$169
Intel Pentium D 840 3.2GHz dual-core 2MB cache 800MHz FSB 90nm	5/26/2005	\$530**	\$485	\$574
Intel Pentium D 920 2.8GHz dual-core 2MB 800MHz FSB 65nm	12/27/2005	\$241**	\$129	\$129
Intel Pentium D 930 3GHz dual-core 2MB 800MHz FSB 65nm	12/27/2005	\$316**	\$155	\$155
Intel Pentium D 940 3.2GHz dual-core 2MB 800MHz FSB 65nm	12/27/2005	\$423**	\$183	\$218
Intel Pentium D 950 3.4GHz dual-core 2MB 800MHz FSB 65nm	12/27/2005	\$637**	\$246	\$246
Intel Pentium D 960 3.6GHz dual-core 2MB 800MHz FSB 65nm	5/1/2006	\$530**	\$324	\$339
Intel Core 2 Duo E6300 1.86GHz 2MB cache 1,066MHz FSB 65nm	7/27/2006	\$183**	\$186	\$182
Intel Core 2 Duo E6400 2.13GHz 2MB cache 1x066MHz FSB 65nm	7/27/2006	\$224**	\$221	\$221
Intel Core 2 Duo E6600 2.4GHz 4MB cache 1,066MHz FSB 65nm	7/27/2006	\$316**	\$314	\$312
Intel Core 2 Duo E6700 2.66GHz 4MB cache 1,066MHz FSB 65nm	7/27/2006	\$530**	\$511	\$510
Intel Core 2 Duo X6800 2.93GHz 4MB cache 1,066MHz FSB 65nm	7/27/2006	\$999**	\$910	\$910
Intel Core 2 Quad Q6600	1/8/2007	\$851**	N/A	\$845
Intel Core 2 Extreme QX6700	11/14/2006	\$999*	\$978	\$970

OmniVision's New HDR Single-Chip Camera Sensor

Generally, the best-quality cameras have HDR (high dynamic range), which refers to an imaging system's ability to capture several light levels in the same image. Now OmniVision says it has created its first color HDR CMOS CameraChip image sensor for mass market cameras. The OV10620 has spectral light sensitivity of up to 1,000nm, letting it detect details in an image whether it's awash with light or submerged in shadows. Applications that will use the OV10620 sensors include backup and rear-view cameras for cars, closed-circuit security cameras, and IP cameras. The company plans on producing chips in volume in the third quarter of 2007. ▲

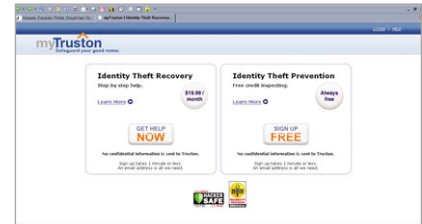
The World's First Intelligent Gamer Web Site?

Ever lusted for a new PC game title but passed on the fragging because you weren't positive your rig could give you your money's worth? Then YouGamers.com is for you. Backed by benchmark king Futuremark, YouGamers offers news, previews, interviews, forums, price comparisons, and home pages. Better, YouGamers tests games on systems of varying performance levels, including a rig that meets a game's specific minimum requirements. Further, a free, proprietary Game-o-meter that is based partially on Futuremark's benchmark results database (numbering over 13 million scores, Futuremark says) can scan your PC to assess how well it will handle games in YouGamers' database (about 100 titles at launch). Still in beta, the site also offers upgrading/purchasing suggestions to bring your rig up to snuff. ▲



Online Identity Theft Protection & Recovery

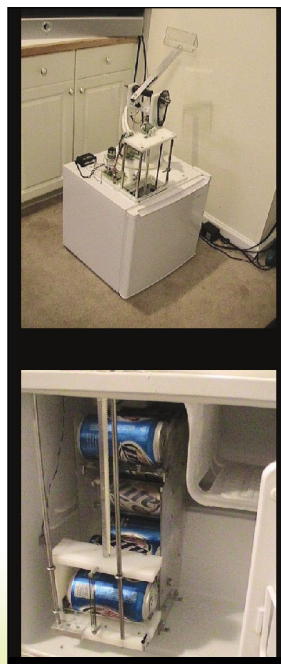
Tom Fragala isn't just the CEO of identity theft-protection company Truston (www.mytruston.com), he's an unfortunate member of the "I've Been Ripped Off Club." To that end, Fragala's company recently released myTruston, a Web-based service consisting of prevention and recovery tools for phone, utility, Social Security, credit card, and ATM card identity thefts. Truston claims myTruston is the only Web-based recovery service that provides such tools without you having to disclose any data other than an email addy. Essentially, myTruston makes the recovery tools available from one location, thus cutting down on recovery time and related costs. To entice prospective users, the site helps you obtain and use a free, quarterly credit report. In the unfortunate event you need myTruston's services, a monthly subscription that you can cancel at any time is \$19.99. ▲



Site Seeing

Hey, Robot, Toss Me A Cold One!

What good is a robot that can't toss you a can of beer when you're dry? That was the kind of questioning that motivated Duke University mechanical engineering grad John W. Cornwell to create a remote-controllable robotic beer-launching fridge. You can see Cornwell's BLF—it includes a 10-beer magazine, elevator, catapult, switches, motors, and sprockets—in action at www.duke.edu/~jwc13/index.html. If you like what you see, Cornwell indicates he's entertaining the idea of producing a limited number of replicates for possibly \$1,500 a pop. ▲



A Domain Name In A Jiffy

From software maker InfoStreet and Register.com comes InstantName.com, an independently run service offering customers a central location for domain name registration and free spam-filtered and virus-protected POP/IMAP email, Web site hosting (100MB), and site creation (wizards and templates) and maintenance tools for as little as \$10 annually (with a two-year registration). InstantName.com throws in a free address book and calendar, and transferring existing domain names is \$9 per domain. Read the terms and restrictions before signing up, but as InstantName.com points out, acquiring all of this from other services could run nearly \$40 per month. ▲



Red Hat Shakes Up Its Linux World

To coincide with the mid-March release of its Red Hat Enterprise 5 OS—which is heavy on new virtualization features and available in basic (\$349 subscription) and Advanced Platform (\$1,499 standard subscription) flavors—leading Linux distributor Red Hat ushered in several significant changes to standard company operating procedure. “We’re not just announcing a new version but fundamentally changing the way we package and sell,” Tim Yeaton, senior VP of worldwide marketing, said at launch. As part of Red Hat’s new vision, the company is creating the online RHX (Red Hat Exchange) store (set for Q2 availability), which Paul Cormier, executive VP of engineering, says is a “single source for research, purchase, online fulfillment, and support of open-source and other commercial software business application stacks” from Red Hat and its partners. ▲



Frances Allen, We Salute You

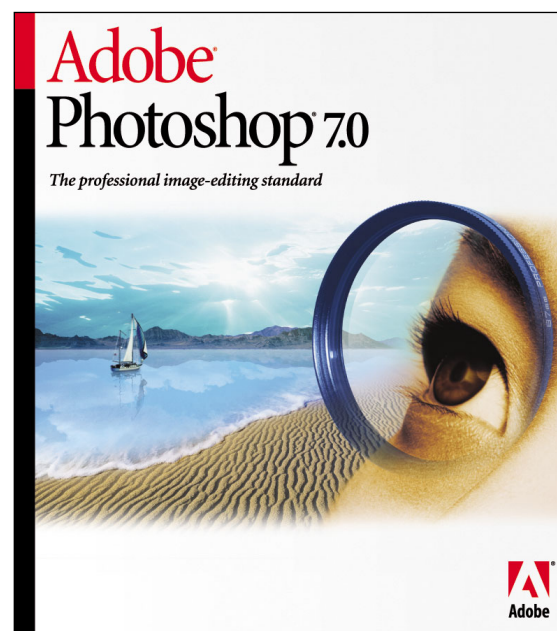
The name Frances Allen might not elicit the same instant recognition as, say, Tim Berners-Lee or Gordon Moore, but Frances Allen deserves our attention nonetheless. Why? The ACM (Association for Computing Machinery) recently named her the 2006 winner of the esteemed Turing

Award, considered the country’s top prize for scientists. More notably, the honor makes the IBM Fellow Emerita the first woman to receive the award. What did Allen do to deserve the distinction? To quote the ACM, she is responsible for “fundamental contributions to the theory and practice

of program optimization,” which contributed to “advances in the use of high-performance computers for solving problems such as weather forecasting, DNA matching, and national security functions.” Now raise your glasses, geeks. ▲

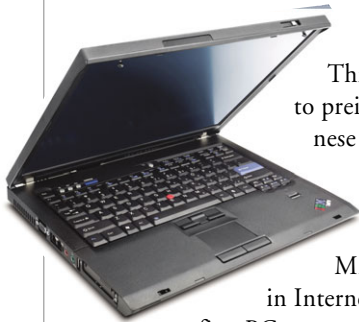
Adobe Takes Photoshop To The Masses

Good news image editors, Adobe CEO Bruce Chizen says Adobe plans to make a free, stripped-down version of Photoshop available online some time before September. The move is part of a larger pre-emptive effort to block Google (think Picasa) and other companies offering Web-based apps from dipping into Adobe’s pot. According to various reports, Adobe plans to offer ad-supported versions of other Adobe products, as well. Adobe already is partnering with Photobucket to give users free video-editing tools via Adobe Remix, a scaled-down version of Premiere Elements. Additional partnerships between Adobe and other Internet and media companies are apparently in the works, with online ad revenue the planned source of funding. ▲



Software Shorts

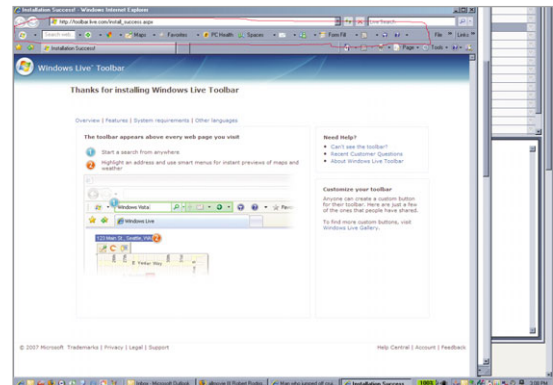
Move Over Google, You've Been Replaced



Well, on Lenovo-branded systems, at least, including ThinkPads and ThinkCentres.

This after Lenovo and Microsoft inked a deal to preinstall Windows Live services on the Chinese manufacturer's rigs. The deal puts Windows Live Toolbar, which offers one-click

access to Live Search, in place of Google's Toolbar. Lenevo is also making Microsoft's Live.com the default home page in Internet Explorer. For Microsoft, the agreement gives it its first PC partner to preinstall Windows Live services on systems. Fear not, Googliters; Lenevo, the world's third-leading PC manufacturer, is giving users the option to select and make Google their search default. ▲



Ride The Lightning

Those bright flashes of light you see off in the distance are coming courtesy of Corel's free WordPerfect Lightning software, now in beta. The free 20MB download mixes such WordPerfect-like options as fonts, styles, bullets, and graphics/photo insertion with online, whiteboard-like communication and collaboration abilities. Among the tools in Lightning are Notes, the app's lightweight word processor and note-taker; Viewer, which displays PDFs and Word and WordPerfect docs; Navigator, a hierarchy-like organizer; and Connector (offered through Joyent), which includes email, calendar, address book, and storage abilities. Crack! ▲



Is The Third Time A Charm?

Despite previous attempts in 2004 and 2005 by Rep. Mary Bono (yep, Sonny's widow) to pass legislation to thwart spyware gaining U.S. House of Representatives' approval only to fall flat in the Senate, members of the House Subcommittee on Commerce, Trade, and Consumer Protection began hearing testimony in mid-March on a similar bill Rep. Edolphus Towns is sponsoring. Towns' Securely Protect Yourself Against Cyber Trespass Act (Spy Act) would make it unlawful to install apps that gather data, monitor usage, push ads, or change browser or system settings without consent. If passed, the bill could result in fines up to \$3 million for certain violations. Towns was quoted, "We are confident and comfortable that this will make it all the way." ▲

BIOS Upgrades Available Online

Compiled by Steve Smith

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new lease on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpumay07/bios to see our entire upgrade list.

Motherboard	Date Available	URL
Abit KN9 Ultra	1/16/2007	www.abit-usa.com/downloads/downloads.php?file=ftp://ftp-usa.abit.com.tw/pub/download/bios/kn9/kn918.zip
ASRock K8NF6G-VSTA	3/6/2007	ftp://download.asrock.com/bios/754/K8NF6G-VSTA(1.60).zip
Asus Commando	2/7/2007	dlsr01.asus.com/pub/ASUS/mb/socket775/Commando/Commando0803.zip
BFG nForce 680i SLI	3/2/2007	www.bfgtech.com/images/BFGRNF680iS%20BIOS%20P25.zip
ECS NF650iSLIT-A	2/9/2007	www.ecs.com.tw/ECSWebSite/Downloads/DownloadFile.aspx?catid=1&driverid=3759&areaid=2&LanID=9
Gigabyte GA-8N-SLI Pro	3/16/2007	america.giga-byte.com/FileList/BIOS/motherboard_bios_ga-8nslipro_f7.exe
Shuttle SN27P2	3/12/2007	ftp://ftp.shuttle.com/BIOS/sn27p2/sn27s00z.bin

The Job Search

Frustrated with the small hard drive on your expensive Xbox 360? Convinced that the Zune was anything *but* an iPod killer? Now you can stop whining about Microsoft's various entries in the hardware market and actually help make them better. The company's Entertainment & Devices Division needs a Quality Analyst to be "embedded" in the teams that make and improve these products. As a Quality Analyst you will collect data from all of the points where users interact with Microsoft and its products and determine where the devices and their software need to go next.

You will be the man (or woman) who turns numbers into meaning, mastering statistical discovery software like JMP and data mining the bottomless pits of feedback Microsoft gets from product returns, call centers, and online support. Then you need to motivate the Microsoft techies to do the right thing and make products better for all of us. Of course, you have to do all of this without a lot of leverage. A key attribute in this job description is the ability "to influence others without authority." Sounds like you may not end up being the most popular guy/gal in the room.

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per minute**

Number of visitors to Super Bowl advertiser Web sites during the big game

Akamai



4.83%

Percentage of global users browsing with Firefox 2.0

OneStat

**19 Hours
a month**

Time spent on the internet by kids ages 8 to 14

Nickelodeon



28%

Percentage of mobile phone users who use SMS to flirt

AT&T

What We Like To Watch

Despite the popularity of YouTube, we are much more likely to click news and music video clips online than user-generated video, says a new survey by InsightExpress and Advertising.com.

Type Of Video	"Likely" To Stream
News clips	48.6%
Music videos	47.4%
Movie trailers	32.6%
TV shows	25.7%
User-generated videos	20.5%
Movies	19.9%
Sports clips	11.2%
Other	8.8%

Source: InsightExpress for Advertising.com

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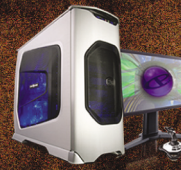


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Microsoft Optical Intelli Explorer mouse
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5600+ CPU	\$ 1719
5200+ CPU	\$ 1645
4600+ CPU	\$ 1606
4200+ CPU	\$ 1569
3800+ CPU	\$ 1549

AMD Athlon™ 64 FX 62	
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\$1549



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5200+ CPU	\$ 755
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4200+ CPU	\$ 679
3600+ CPU	\$ 609

\$609



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TL-52	\$ 1299
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The Dominos Fall

While I was in San Francisco attending the annual Game Developers Conference in early March, I ran into a former WildTangent employee who now manages external studio development for a top console game publisher. He told me his employer was in the process of carving its major game development teams down from hundreds of people to teams of 40 or less and moving much of the production overseas. He told me most of the other leading game publishers were in the process of doing the same thing. With the advent of next-generation consoles demanding more art and technology to achieve realism, this trend in gaming might seem counterintuitive, but the phenomenon is consistent with an industry problem I've written about on many occasions. When the market gets fragmented by wildly differing and incompatible game platforms, game quality suffers. Put simply, this fragmentation diverts resources that might otherwise be spent on making a great game to porting, compatibility tools, and multiplatform marketing. The problem exists in PC and console gaming, and is especially bad in the mobile game business.

What's happening in the console space is an accelerated collapse of resources devoted to making great games as publishers are forced to redistribute their bets across multiple incompatible platforms and technologies. In each console generation, competing manufacturers attempt to differentiate their offerings from competitors' with exotic hardware architectures and/or controllers. When the market has no clear, dominant winner, game developers can't afford to target any one of these platforms for their content. They need to design their games to run on all of them, which means that they either have to compromise and build their games to run on the feature set that is the generation's lowest common denominator, or divert development resources to optimizing their games for each platform. If a developer does buck the trend and chooses to back just one platform, it may need to reduce the scope of its game design anyway to account for the smaller possible buying audience the game will reach as a result.

The increased graphics capabilities of new platforms further fragment resources because a greater portion of a game's development

budget must be invested in R&D and authoring tools to take advantage of the better graphics. In other words, the introduction of competing next-generation consoles results in a collapse in emphasis on game design until a clear market winner is established and a new generation of development tools and infrastructure has evolved to make game development more economical. In the meantime, publishers must dramatically shrink the size of game development teams and outsource development work overseas.

The most extreme version of this problem exists in mobile gaming, where developing an original mobile game can cost \$30,000 to \$50,000 but porting it to hundreds of mobile handset specs can cost \$500,000. As a consequence mobile games are fairly rudimentary, minimally interactive content because trying to push the production values of a mobile game would significantly reduce the size of its possible market. Highly talented game developers can't differentiate their content by making a spectacular original mobile game, so those guys go out of business leaving the cheapest, most prolific developers to flood the space with commodity content. The winner in mobile gaming is not the company with the best games but the company with the cheapest eastern European development shop and best carrier relationships.

When I talk to 3D chip makers and PC OEMs, they always ask me how to get game developers to design games for their latest and greatest gaming technologies. They never like my answer, which is that instead of focusing on making an exotic new product that is 10 times better than what the market has they should focus on making a product that is two times better but easy and/or natural for existing content to take advantage of. This is the lesson Nvidia may have learned with its new DirectX 10-compatible GPUs. They have great new graphics features that developers may bother to fully take advantage of in several years when they have a significant installed base, but in the meantime even DirectX 9 games running on Windows XP will see substantial performance improvements from the same hardware. ▲



Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multi-media browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

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by wildly
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by Marty Sems

Cyberdyne HAL-5

Unmistakably Japanese but taking name cues from American sci-fi classics, the HAL-5 (Hybrid Assistive Leg) exoskeleton is about to start stalking out of a University of Tsukuba venture firm called Cyberdyne (www.cyberdyne.jp/english/index.html). It can multiply the wearer's strength by two to 10 times, so it's just the ticket for clobbering Alien Queens when they need it. The HAL's newest battery can last up to five hours. We've been tracking this "wearable robot" for the past couple of years, but it's time to talk about it now that it's going commercial. Currently available for rental in Japan, it may soon be coming to other countries for about \$1,300 to \$3,900 per month. In a somewhat altruistic PR outing, the HAL-5 will be used to help a renowned mountain climber fulfill a quadriplegic's wish to climb to the summit of the Breithorn mountain in the Swiss Alps.

JBL Project Everest DD66000

Speaking of mountains, Mt. Everest is a daunting prospect even to professional climbers, as recent headlines have reiterated. Likewise, JBL's continuation of its Everest reference speaker line (www.jbl60th.jp) strikes fear into the pocket-books of even dedicated audiophiles. Project Everest DD66000 loudspeakers feature a highly sophisticated design, semi-exotic materials, and carefully chosen crossover points. The result is articulate imaging, dynamic linearity, and a smooth frequency response extending past the 50KHz exosphere. Everests are priced at \$60,000 to \$70,000 a pair, depending on the choice of veneer, which includes rosewood, maple, ebony, and cherry. Forget all the JBL iPod docks and consumer-level stuff—the company says it has never made a finer loudspeaker, and that rings true.

RED ONE

Where were you when the paradigm shifted? That sound you hear is the digital cinematography landscape changing, if the ONE camera from RED (red.com) lives up to its promise. All eyes are upon it not only for its 12MP Mysterium CMOS sensor, which is amazing, but also for its low target price of \$17,500—about a fifth of what the industry expects. It can shoot 4,520 x 2,540 progressive-scan RAW video at up to 60fps with incredible dynamic range and color fidelity. Made of aluminum alloy with stainless steel attachment points, the modular RED ONE is configurable enough for everything from portable news-gathering to full-on cinematic filming. Before long, every director could be seeing RED. ▲





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Fit For The A/V Rack

Seven Cases That Make Your HTPC Presentable

A home-theater PC is a lot more than just a PC with a TV tuner. The key to building the ideal HTPC starts with choosing a case that can accommodate the components you need, store all of your drives, keep quiet, and look sharp enough to reside beside your home entertainment gear. I took a hard look at seven HTPC cases that were designed from the ground up to handle your home entertainment with style. In all but one instance, the cases are desktop-style configurations that will fit in your

designed (and priced) to stand out like a Rolls Royce among Volkswagens. The HD160XT features an all-aluminum construction that's thicker than that of the other aluminum cases in this roundup. The greater thickness adds to the overall weight but makes for a more solid feel. Zalman only used three rivets in the whole case, letting you remove almost any part of this case with a few spins of a screwdriver. A 7-inch, touch-sensitive LCD dominates the HD160XT's front panel, which also has a power button, IR

up to five drives. The optical drive cage holds a single drive.

The unit ships with M-Play software and a remote for controlling the HTPC from the comfort of your sofa. The LCD and software took some finagling to get up and running, but otherwise worked well. My big complaint with this case is that, when fully assembled, there are dozens of wires and cables crisscrossing the motherboard. Fortunately, Zalman provides a handful of cable clamps to help reign in the chaos. If you can afford it, this case can be an eye-catching addition to your home theater setup.



HD160XT
\$599.95
Zalman
www.zalmanusa.com
● ● ● ●

Thermaltake Mozart VC4000SNS

At first glance, Thermaltake's Mozart VC4000SNS appears to be less violin concerto and more heavy metal. The steel case features a black and silver, heavy-duty, brushed aluminum front bezel. Remove the silver wraparound top panel to access the interior of the case from three sides. I liked the extra maneuvering room, but the wraparound top panel leaves you with fewer surfaces upon which to clamp and route wires.

The right side of the front bezel features a hinged door that conceals three external 5.25-inch drive bays, but only the middle bay has an opening through which a drive tray can pass. This door is rather heavy, and when you release it from the plastic latches, it falls open rather gracelessly. Front panel ports, power and reset buttons (with red and blue LEDs), and the MediaLAB window occupy the left side of the front bezel.

Inside, the Mozart can accommodate up to five 3.5-inch drives. Thermaltake's Mozart VC4000SNS does not include

A/V rack. Also, all but one HTPC case features either an LCD or VFD for displaying items such as a graphic equalizer, the currently playing media, and more.

Each case features front panel connectors consisting of one FireWire, two USB, mic, and headphone ports. I included budget, midrange, and high-end HTPC cases for builders at any budget.

Zalman HD160XT

Most HTPC cases are designed to match your existing Hi-Fi equipment. Zalman's HD160XT, however, was

port, volume dial, drive tray, and function buttons. A magnetic flip-down panel at the bottom edge of the front bezel conceals a media card reader and the front panel USB, FireWire, and audio ports.

Under the hood, the HD160XT features four fans: two 80mm fans on the rear panel, one 92mm fan on the left panel near the HDD bays, and another 80mm fan in the bottom of the case near the PSU bay. The top panel features a sliding vent that you can open or close as desired. The HDD bays feature rubber grommets and accommodate


Mozart VC4000SNS

\$119.99

Thermaltake

www.thermaltake.com

PC-C31A

\$139.99

Lian-Li

www.lian-li.com

Fusion

\$219

Antec

www.antec.com


features two external 5.25-inch drive bays with spring-mounted bay doors. You'll find the front panel ports in the lower-middle portion of the front bezel and power and reset buttons and LEDs in the lower-right corner. From the exterior, the PC-C31A appears to be going for the subtle look, but we all know it's what's inside that really counts. A single thumbscrew secures the top panel to the case. Inside, the PC-C31A offers several tool-less features, including thumbscrew-mounted 5.25-inch and 3.5-inch drive bays and more thumbscrews holding the expansion slot covers in place. Lian-Li also includes antivibration screws and grommets for up to two hard drives. Simply install the screws and grommets and slide the hard drives in place.

The case has two 120mm fans installed in the right side panel and situated above the CPU. This case exhausts warm air and takes in cool air through a plethora of vents in the bottom, right, left, and rear panels. Because the case is designed for Micro ATX motherboards, you will find plenty of room for routing wires and maneuvering components. Lian-Li also put that extra room to good use by elevating the PSU to let more air circulate inside the case.

This case does not include a VFD module, but you can remove one of the 5.25-inch drive bay doors and install a third-party VFD yourself. The case does not include much in the way of extras, but its no-nonsense style is certain to score points with the less-is-more crowd.

Antec Fusion

Antec has taken its case design philosophy to new heights with the Fusion. This steel case weighs more than any other case I reviewed, thanks in part to the extra steel used to wall off the PSU, hard drive bay, and motherboard area to improve cooling efficiency and reduce noise output. The brushed aluminum front bezel's left side sports a VFD panel and an optical drive bay, while the right side includes a large volume dial, power and reset buttons, and audio ports. USB and FireWire ports are in the middle.

the MediaLAB kit, which has the VFD module, remote, and software, but you can purchase it separately for \$99. In my tests, the 2-line VFD module performed well once I installed the updated version of the software from Thermaltake's site. It's capable of displaying a graphic equalizer, system information, media information, daily news, weather and time of day for multiple cities, and new email notifications.

Inside, the Mozart VC4000SNS features two 60mm fans on the back panel

and one 80mm fan on the front. Seven expansion slots let you fill this HTPC with all kinds of extras. The case also includes a case-open alarm, an optional locking tab, and a VFD cleaning cloth. The interior of the case is well-conceived, but the front bezel is a mixed bag, both functionally and aesthetically.

Lian-Li PC-C31A

Lian-Li's offering is an ultra-lightweight, brushed aluminum case, available in silver or black. The front bezel

Removing a single thumbscrew grants access to the case's interior. The Fusion features two side-mounted 120mm fans that blow fresh air over the CPU and past the hard drives as it exits through the vent in the bottom of the case. You can also customize the Fusion's cooling using two fan speed switches, an adjustable airflow baffle, and a fan port cover.

Antec also includes a 430-watt PSU, which should provide more than enough power for your HTPC. The Fusion is somewhat limited in the number and variety of drives you can install, offering just a single external 5.25-inch drive cage and a 3.5-inch drive cage capable of holding two drives. Rubber grommets and plastic clips reduce vibrations and hold the hard drives in place. The case also comes with two cable ties and an assortment of slots and holes that you can use to make this a tidy, tangle-free HTPC.

The programmable VFD and volume dial are designed to work with Windows XP Media Center Edition and third-party applications. The 2-line VFD is capable of displaying system information, media information, a graphic equalizer, news feeds, weather and time of day for multiple cities, and email alerts. The aptly named Fusion blends efficient case design with an attractive visual appeal.

nMedia HTPC 100BA

For the budget HTPC builder, nMedia's HTPC 100BA is an enclosure with lots of extras. The HTPC 100BA is smaller than the rest of the cases I tested and, due to its thin steel construction, lighter

than even the aluminum cases. The sides, top, and bottom of the case are painted black and well-ventilated. The top panel also features a CPU fan duct. The front bezel is made of black plastic made to look like brushed aluminum. Slide two panels away from each side of the front bezel to reveal the card reader and USB, Fire-Wire, and audio ports. A single-hinged door conceals the case's lone 5.25-inch drive bay. Below the drive bay, you'll find a nonprogrammable LCD, CPU fan speed control dial, LCD-specific buttons, and the power button.

Two thumbscrews secure the top panel. Inside, the 100BA features a single removable drive cage that lets you install the optical drive and a hard drive. You can install a second hard drive beside the card reader, but if you're desperate for more storage, you will have to remove the card reader. The case comes with a single 60mm fan and an nMedia 300-watt PSU. The rear panel features an S/PDIF port and four expansion slots.

Overall, this case just feels flimsy. The PSU housing was bent at the screw hole, but I was able to bend it back with minimal force. Also, when reinstalling the drive cage, I needed to push on the sides of the case just to line up the screw holes. With the feature-laden HTPC 100BA, the question becomes: Are the extras even worth the paltry asking price?

nMedia HTPC 300BA

Styled to look like a home theater subwoofer, the HTPC 300BA is the only HTPC case in this roundup to eschew a



HTPC 300BA

\$49.99

nMedia

www.nmediapc.com



horizontal configuration in favor of a tower design. The lightweight case is constructed of thin steel and painted black. The left panel includes a fan duct over the CPU. The black plastic front bezel sports a narrow band of aluminum along the left side. Slide up the panel at the top of the front bezel to reveal the reset button and the external 3.5-inch drive bay. The bottom portion of the front bezel features a chrome plastic and wire mesh fan duct aligned with the PSU bay. Front panel ports are along the right side of the front bezel. The rear panel features six expansion bays, an S/PDIF port, the PSU extension cord port, and two 60mm fans. A third 60mm fan is in the front of the case, next to the PSU.

Unlike the HTPC 100BA, this case wisely lets you choose your own PSU. The HTPC 300BA also differs in that it accommodates either ATX or Micro ATX motherboards. The case is only 3.75 inches wider and 0.5 inches higher than the Micro ATX-only HTPC 100BA, so there's very little wiggle



HTPC 100BA

\$89.99

nMedia

www.nmediapc.com



room. If you plan to use a PSU longer than 5.5 inches, be aware that it will block portions of the lower-right corner of an ATX motherboard.

Like the HTPC 100BA, this case's thin steel and plastic construction aren't very durable, but these materials are common in sub-\$50 cases. Furthermore, unless the case is oriented at eye level or higher, the front bezel's sliding panel partially blocks the external 3.5-inch drive bay from view. This case's smaller size and visual styling are about the only thing that distinguishes it from other desktop-style cases at this price range, many of which are made better and easier to use.

SilverStone GD01B-MXR

The SilverStone GD01M-MXR has a very minimalist design with the cleanest-looking front bezel of the bunch. This rather heavy HTPC case consists of a thick steel frame, black panels, and a brushed aluminum front bezel with a concave profile. The right side panel features a fan port, and the left side features a large wire mesh vent near the PSU. There are seven expansion ports



GD01B-MXR

\$239

SilverStone

www.silverstonetek.com



and two 80mm fans on the back panel. The right side of the front bezel consists of a large bay door that conceals two external 5.25-inch drive bays. The bottom edge of the front bezel also has a door that covers the reset button, front panel ports, and card reader. Both doors ease open slowly when you press the small indicator arrow.

The programmable VFD in the upper-left corner of the front bezel uses the same software and hardware as the Thermaltake Mozart and performs well once you download a software update. With

six internal 3.5-inch drive bays, this case is capable of becoming a real multimedia warehouse. You can give yourself plenty of room to work in this case by unbolting the crossbar and removing several screws to pull out the drive cages.

SilverStone also threw in enough rubber grommets for every hard drive. Other extras include a shielding magnet and an optional case locking tab. Although it doesn't look much like a Hi-Fi component, it'll rock your A/V rack. ▲

by Andrew Leibman

A home-theater PC
is a lot more than just a PC with a TV tuner.

What's In The Box

	Ports	Drive Bays	Display	Motherboard, Expansion Slots	Other Features	Dimensions (HxWxD, inches)	Price	CPU Rating
Zalman HD160XT	2 USB, 1 FireWire, mic and audio out	5 3.5-inch internal, 1 5.25-inch external	7-inch, touchscreen LCD; 1,024 x 768 resolution	ATX, Micro ATX, 6 full-height cards	3 80mm fans, 1 92mm fan, card reader	6.3 x 17.1 x 18.1	\$599.95	4
Thermaltake Mozart VC4000SNS	2 USB, 1 FireWire, mic and audio out	5 3.5-inch internal, 3 5.25-inch external	Programmable MediaLAB 2-line display	ATX, Micro ATX, 7 full-height cards (sold separately)	1 80mm fan, 2 60mm fans	6.7 x 16.9 x 17.8	\$119.99	3.5
Lian-Li PC-C31A	2 USB, 1 FireWire, mic and audio out	2 3.5-inch internal, 2 5.25-inch external	N/A	Micro ATX, 4 full-height cards	2 120mm fans	5.9 x 17.1 x 17.3	\$139.99	4
Antec Fusion	2 USB, 1 FireWire, mic and audio out	2 3.5-inch internal, 1 5.25-inch external	2-line VFD	Micro ATX, 4 full-height cards	2 120mm fans, 430W PSU included	5.5 x 17.5 x 16.3	\$219	4.5
nMedia HTPC 100BA	2 USB, 1 FireWire, mic and audio out	2 3.5-inch internal, 1 3.5-inch external, 1 5.25-inch external	LCD (Time, date, CPU temp, case temp, fan speed)	Micro ATX, 4 full-height cards	1 60mm fan, 9-in-1 card reader, 300W PSU included	5.5 x 13.8 x 15	\$89.99	2
nMedia HTPC 300BA	2 USB, 1 FireWire, mic and audio out	3 3.5-inch internal, 1 3.5-inch external, 1 5.25-inch external	LCD (CPU temp and heatsink fan speed)	ATX, Micro ATX, 6 full-height cards	3 60mm fans	14.5 x 5.5 x 18	\$49.99	3
SilverStone SST-GD01B-MXR	2 USB, 1 FireWire, mic and audio out	6 3.5-inch internal, 1 3.5-inch external, 2 5.25-inch external	Multilanguage-capable VFD	ATX, Micro ATX, 7 full-height cards	2 80mm fans, 52-in-1 card reader	6.7 x 16.9 x 16.9	\$239	4.5

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

PC Speaker Systems

Music To Your Ears Or White Noise?

It's bizarre. With multicore CPUs and DirectX advances, between blue laser, high-def and respectable HD audio, the past few years have brought dramatic increases in the quality of PC-based multimedia. And yet, on the surface at least, speaker technology seems not to have kept pace. New face plates and model numbers aside, we're still looking at the same 2.1 and 5.1 rigs filling store shelves that we saw three to five years ago. Has anything changed under the exterior? I wanted to find out.

How I Tested

Traditionally, speakers are one of the harder things to test because much of the analysis is subjective; so I took a two-pronged approach to testing by doing the usual subjective listening to a variety of music, movies, and gameplay while verifying my findings by using RightMark's Audio Analyzer to produce frequency response graphs for each speaker set.

To test the speakers, I used a Pentium 4, Windows XP-based box with a Creative X-Fi Fatal1ty card. Although I played around with lots of content across each set, I soon settled on four familiar standby tracks on which to base most of my subjective observations. For DVD audio, I had Foreigner's "Jukebox Hero," a great rock song with strong bass and in-your-face vocals, and Fleetwood Mac's "The Chain." "The Chain" in particular is excellent for testing because you should be able to hear the hard edge in each string pluck; the vocal harmonies are spine-tingling when you get their full sonic range; and that fat bass drum should sound like angry cattle stampeding through your head.

My two favored movie scenes were, of course, the lobby shooting spree from "The Matrix" and "Under Attack" in "Master and Commander." Both are excellent for testing how well satellites are able

to render sounds distinctly in surround space. "The Matrix" scene in particular is telling when you hear the tinkle of shell casings coming from the rear channels. With good speakers, you hear each casing bounce off the floor in sparkling clarity; with inferior quality sets, these highs sort of congeal into an indistinct blur.

I used RightMark Audio Analyzer in loopback mode with a preamp and an Audix OM5 studio microphone positioned right where the listener would sit in a usual desk arrangement, with the front satellites about 4 feet from each ear and the rears about 6. Then I calibrated the speakers with Creative's X-Fi utilities and arrived at a custom EQ setting that emphasized bass and treble. I kept the software volume at 50% and made any subsequent changes on the speakers themselves. In all fairness, different speakers need help in different areas, and I would usually do a first round of listening at regular settings, adjusting the EQ to try and better fit the content to each speaker set for a second round.

Additionally, Logitech's Z-5500 Digital served as the point of comparison for each system's sound quality, taking into account that the 2.1 sets naturally couldn't produce as many discrete channels. The Z-5500 Digital is an excellent set and has stood the test of time. In fact, you may even want to forgo the pricier 5.1 systems in this review and go with the Z-5500 Digital. (For CPU's review of the Z-5500 Digital, please see page 17 of the January 2005 issue.)

2.1 Speakers

Creative I-Trigue L3800

The I-Trigue L3800 is one of Creative's top-end 2.1 speaker systems, most notable for its "lateral firing transducers," an extra cone built into each satellite that fires

sideways, away from center, to enhance mids and widen the soundstage. The impressive controller pod and IR remote also add to the value of this set. The top of the pod includes controls for power, mute, and main and subwoofer volumes. On the front of the pod you'll find line-in and headphone jacks along with an LED display for the volume level. This pod is also the receiver for the remote control. The remote provides access to the key speaker settings and can control specific functions of a Creative Zen MP3 player that's connected to the speaker system.

Every once in a while, I ran into discrepancies between my subjective and objective observations, and this was one occasion. The RightMark chart shows some fairly high response through the mids—in the 200 to 1,000Hz range. This might indicate that those side-firing cones are doing their job, but in reality, I found the mids on this set sorely lacking (particularly in music listening, where they seemed particularly absent). Ideally, the RightMark graphs should show smooth, flat lines, but this Creative set shows the most erratic mids of any 2.1 set and joins the iRhythms for having nasty crossover fallout in the 100 to 200MHz band. The



I-Trigue L3800

\$149.99

Creative

www.creative.com



L3800 had the highest treble production, but this is actually a bad thing. Creative seems to be overdriving the treble in order to simulate a full audio spectrum in the face of insufficient satellites. When I listened to the speakers, I found that highs distorted easily and often sounded shrill.

For undemanding audio, such as MP3s and regular movie viewing, the L3800s are decent, and you do get the feeling of a broader-than-average fidelity. It's only when you push the set to perform that the illusion crumbles.

Cyber Acoustics iRhythms A-211

The Cyber Acoustics iRhythms A-211 is a 2.1 speaker set designed to work specifically with an iPod while including PC connectivity. This "Dual Source Input" (hint: beware of vendors coming up with fancy branding for everyday features) lets you simultaneously connect the speakers to both the PC and iPod and automatically switches to the iPod when it's active. The A-211, which comes with all of the necessary docking adapters, will also charge your iPod as it's playing.

The dock also serves as the control pod for these speakers, but its lack of any actual speaker controls detracts from this set's suitability for PCs. The only way to control any function on this 2.1 set is with the wireless remote. Lose it and you'll never be able to change the speakers' volume again.

There's a knob on the back of the 75W subwoofer to control its output—inconvenient but standard on many 2.1 sets. Lastly, perhaps to match the iPod, the sub



iRhythms A-211

\$249.99

Cyber Acoustics

www.cyberacoustics.com



Spot

\$129.95

JBL

www.jbl.com



Spyro

\$129.95

JBL



and satellites are encased in black acrylic that looks cool but shows dust and fingerprints like mad.

Either the acrylic finish or some really bad assembly created substantial rattle in the sub whenever I played anything with loud bass. Ignoring this, the A-211 fared moderately well in my tests except for a crevasse in midrange response. Highs cut out a little early, so you don't get much sparkle. Ultimately, assuming that bass rattle is the exception and not the norm in this model, Amazon's current price is closer to the mark for this set.

JBL Spot

JBL's Spot surprised me with its performance for the size and price. Obviously, this set's 24W sub and 6W satellites aren't going to crack the foundation, but they do provide a decent listening experience with a touch of pizzazz. The mushroom-shaped speakers even come with black and white interchangeable covers. (You can order colored shells from JBL.) There's no pod or I/O jacks, only a sub output control and two volume buttons on the right satellite that support a handy one-tap muting feature.

Overall, I was impressed with the Spot for its price. The bass was predictably tame, but it wasn't bad—appropriate for an apartment or dorm room. When I cranked the volume beyond the half-way point, distortion became evident.

Response was pretty even from low to high, and the satellites sounded very clear without being too sharp. Mids may have lacked clear definition, but I'm less worried about this in a trendy 2.1 set clearly aimed at music playback. My movie scenes sounded slightly claustrophobic and artificial, but if you keep Spot in its comfort zone, it'll sound just fine.

JBL Spyro

Mushrooms not your bag? Try some flower power. JBL's Spyro uses the Spot's subwoofer but swaps domed satellites for flower petals. My particular set came in sea foam green but (thankfully) offers the same exchangeable skins as the Spot.

Being essentially the same underlying hardware, I expected the Spyro and Spot to yield identical performances, and that expectation wasn't far off. The Spyro's sub provided a little fuller base and marginally better mids. Highs were also a pinch better. But these slight gains may be due to individual variances in each set's electronics rather than inherent superiority in the model. Overall, I only found one compelling reason to buy the Spyro over the Spot: The women who examined these sets all preferred the flower design.

Logitech X-240

The X-240 is Logitech's latest 2.1 system. One of the most unique features of this affordable set is the stowaway device



X-240
\$49.99
Logitech
www.logitech.com
●●●●●

cradle built into the control pod. This lets you effortlessly connect your MP3 player to the auxiliary-in port while still having access to the bottom of the device so that an iPod charging or sync cable can be connected. The pod also has a headphone jack and easy-access controls for volume and power.

Don't expect this system's 15W down-firing subwoofer and 5W satellites to blow you out of the room. However, the compact size can be a plus for small offices or apartments, and the satellites' styling blends well in most home settings. All of the cables are permanently connected to the subwoofer and provide enough length for most desktop-area speaker placements, making setup a breeze.

This set's subwoofer has what Logitech calls "dynamic, real-time bass equalization" to maximize the bass response, and it did provide a noticeable difference over some of the other systems. These speakers also had the flattest frequency response (which is good) of everything I examined, showing Logitech's prowess even at this price.

I'm not saying this is the perfect 2.1 set, though. The bass is easily overdriven, and the lack of power leaves you unsatisfied at times when you want real volume. At low to moderate volumes, though, the X-240 has very good sound clarity. Even the highs are crisp and true. All in all, if you don't need surround, the X-240 delivers the best small environment bang for your buck.

5.1 Speakers

Altec Lansing FX5051

With a USB connection and a driver installed, Altec Lansing's FX5051 can pull in 5.1 surround without a 6-channel audio adapter installed. But who's going to pay \$200+ for speakers and not have at least 5.1 AC'97 or HD Audio on his motherboard? Excellent question. For consistency's sake, I conducted my formal testing using this set's conventional analog connections. When I tried the USB functionality for giggles, the results were decent but a far cry from the X-Fi's capabilities.

Altec's multifunction pod controls not only the main and subwoofer volume levels but also treble and rear volume levels. The pod's input port lets a PC and MP3 player connect at the same time, and there's integrated upmixing to 5.1 from stereo or 4-channel input. I appreciate the satellites' removable bases that allow for wall-mounting.



FX5051
\$249.95
Altec Lansing
www.alteclansing.com
●●●●●

Testing revealed the choppiest frequency response of any 5.1 set I heard. Swinging the X-Fi's 30.1Hz EQ band from bottom to top yielded virtually no change in the bass, and this system's ridiculously low 75dB signal-to-noise ratio started introducing distortion not much beyond moderate volumes. Still, I didn't hear as much treble breakup as RightMark led me to expect; vocals had good presence, and channel separation was quite good.

At \$150, the FX5051 would be more persuasive. And be warned: Altec's woofer port puts out wicked wind gusts when you crank it up.

Creative GigaWorks ProGamer G550W

Some of my immediate impressions of the G550W: "Man, now *that* is what speakers should sound like!" "Cool! Bare copper speaker wire clips for longer satellite runs." "Are the rears really wireless if they still have power cables?"

The good news is that the 2.4GHz rears showed the same quality as their wired twins with no discernable latency. Creative's pod has headphone-out and auxiliary input along with master volume, bass, treble, and surround levels controlled via a pushbutton knob that makes fine tuning a breeze. Like L3800, the I-This package also includes a wireless remote capable of controlling specific Creative MP3 players.



GigaWorks ProGamer G550W
\$399.99
Creative
●●●●●

Save for a bass trough around 30Hz, this set came off very smoothly both in RightMark and on my ears. During movie tests, clarity and channel separation were excellent, and no other set made the splintering wood splashing down in the water in "Master and Commander" sound more lifelike. Some music vocals seemed to fall off a bit, and bass occasionally fluttered a bit under drum-pounding rock and dance tracks. That said, the subwoofer was solid with most content.

Creative proves with the G550W that money talks, and the results are impressive. For those with challenging satellite arrangement needs, this is my pick of the group.

Cyber Acoustics A-5640rb

The A-5640rb system emerged as the price-performance leader of all the sets I



A-5640rb
\$109.98
Cyber Acoustics



reviewed. Although it's not without flaws, this set delivers midlevel performance at a rock-bottom price. The A-5640rb has large 6.2W satellites with color-coded RCA plugs that correspond to jacks in the back of the 23W sub. A blue LED-lit, mouse-shaped pod features a headphone jack and controls the main and subwoofer volume, fader, and power. The blue light is cool but may be too distracting for movie viewing in a dark room.

The RightMark graph shows bass performance not far from the G550W and Z-5500 Digital. In listening, though, the latter two sets have excellent bass response that is (as good bass should be) omnidirectional: You honestly can't tell where it's coming from. With the A-5640rb's 10-inch woofer, I could close my eyes, turn in three circles, and point straight at it. Said differently, the bass is there, but it's not impressive. Clearly, size isn't everything.

Midrange sound on this set required a lot of EQ tweaking. You can see in the RightMark graph that the 100 to 200MHz crossover region almost looks overcharged, then plunges into a valley. The overall impression sounds flat.

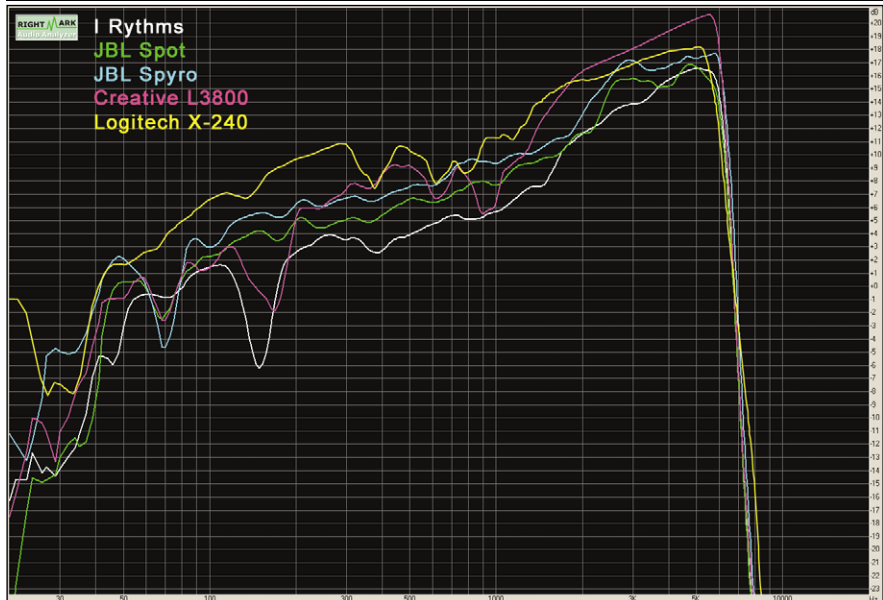
Some highs, such as string plucks in "The Chain" lost accuracy, and I noticed that channel clarity in the rears was pretty mushy in some movie scenes. But for \$100, this is nit-picking. Those who are on tight budgets but crave 5.1 need look no further. ▲

by Billy Ristler

Our Octuplet Of Speaker Sets

	Frequency response			Output power (W)	
	Price	Published	Measured deviation	Sub	Satellites
2.1 speakers					
Creative L3800	\$149.99	30Hz to 20KHz	20.6dB	30	9
Cyber Acoustics A-211	\$249.99	30Hz to 20KHz	16.6dB	75	29
JBL Spot	\$129.95	40Hz to 20KHz	16.9dB	24	6
JBL Spyro	\$129.95	40Hz to 20KHz	17.7dB	24	6
Logitech X-240	\$49.95	40Hz to 20KHz	13.7dB	15	5
5.1 speakers					
Acoustic Authority A5640	\$109.98	30Hz to 20KHz	16.7	23	6.2
Altec Lansing FX5051	\$249.95	30Hz to 20KHz	19.2	28	12*
Creative GS550W	\$399.99	35Hz to 20KHz	16.3	130	36
*Center channel speaker rated at 13 watts					

*Center channel speaker rated at 13 watts



Logitech Harmony 1000

With a gorgeous 3.5-inch QVGA touchscreen, black-on-brushed aluminum face, and a comfortable design not much larger than your palm, the Harmony 1000 exudes style and smart design. Unlike similar über-remotes, you (supposedly) don't need to hire a programmer to script the 1000's functions. Simply install the Harmony PC client and spend a few minutes adding the devices (there's support for over 175,000 devices) you own and functions you want to perform. Dock the remote in its USB charging cradle and sync the data from PC to remote.

I set up six devices, ranging from an ancient Sharp VHS deck to an Xbox 360. That's right, the 1000 outputs both IR and RF signals. In fact, adding the Harmony RF Wireless Extender (\$150), which is an RF-to-IR blaster with up to eight IR bulbs,

lets you operate your gear even if it's hidden in a home theater cabinet.

Prior Harmony units could require pressing up to a dozen buttons to navigate to device-specific settings, such as a receiver's DSP mode, but I found the 1000's UI sensibly presented a device's options. The few fixed controls under my thumb were intuitive, and I loved the UI's layout, with one exception.

When I pressed an Activity icon, such as Watch A DVD, the remote simultaneously issued several commands to different devices; the commands conflict with each other if their timings are even slightly off. I spent the hours with the Harmony software, repeatedly tweaking IR settings. Every Activity command required pressing



Help to reissue the commands and sometimes navigating through Help's Q&A process to access each component individually.

There's no reason why Logitech couldn't have programmed this pricey remote with enough intelligence to learn user problems. If you have to habitually step

through Help, the remote should try different timings and, if successful, sync the right formula back to the Harmony software. Given Logitech's marketing, troubleshooting is the remote's job. If you can forgive this and customize the timings yourself, the Harmony 1000 is a dream come true. ▲

by Billy Ristie

Harmony 1000

\$499.99

Logitech

www.logitech.com



Specs: Rechargeable Lithium-ion battery; USB charging station; 175,000+ devices supported; 3.5-inch touchscreen

Asus M2A-VM

Several months after AMD and ATI tied the knot, the happy couple introduced the first fruits of their collaboration, the AMD 690 chipset. AMD offers two versions of the chipset—the 690G and 690V—which are coupled with Radeon X1250 and X1200 graphics, respectively. The 690 supports Socket AM2 Athlon 64, Athlon 64 X2, and Sempron processors. It also offers 20 PCI Express lanes, two independent display controllers, and built-in HD audio. The chipset is also Avivo-compliant and features integrated HDMI and DVI outputs with HDCP support. (The 690V edition lacks the HDMI support.)

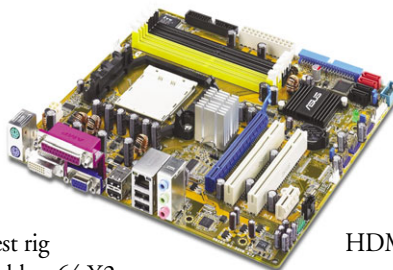
AMD touts the chipset as an ideal HTPC and business application platform, offering it primarily for Micro ATX motherboards. AMD sent me the 690G-based Asus M2A-VM motherboard to test, and I compared it to the nForce 430- and GeForce 6150-equipped M2NPV-VM, also

M2A-VM

\$80

Asus

www.asus.com



from Asus. My test rig consisted of an Athlon 64 X2 5200+, 150GB WD Raptor, and 1GB of Corsair DDR2-800 memory.

AMD designed the 690's integrated graphics to be robust enough to handle Windows Vista's Aero interface, but keep in mind, this is still a DX9-based IGP. The idea here is versatile multimedia display capabilities, not hardcore gaming performance. The Radeon X1250-equipped board scored 276 in 3DMark06, compared to the GeForce 6150's 205. In PCMark05's graphics benchmark, the 690G topped the nForce 430 with a score of 1538 to 1367. In Dr. DivX, the nForce 430-based machine managed to encode an 824MB file five seconds faster than the AMD 690 machine. The nForce 430 also

barely bested the AMD 690 in WinRAR by archiving a 500MB file in 3:59, compared to the AMD 690's 4:03 (minutes:seconds).

The M2A-VM didn't include an HDMI module, although its chipset supports it. Still, this board offers a solid, affordable, Vista-capable foundation. ▲

by Andrew Leibman

Benchmarks

	Asus M2A-VM	Asus M2NPV-VM
PCMark05	4101	4293
CPU	5214	5319
Memory	4212	4232
Graphics	1538	1367
HDD	6928	2184
3DMark06	276	205
SM 2.0	126	94
CPU	1935	1973
Dr. Divx*	6:14	6:09
WinRAR*	4:03	3:59

*(minutes:seconds)

Specs: Chipset: AMD 690G + ATI SB600; Memory: Dual-channel DDR2-800/667/533 (8GB max); Graphics: Radeon X1250; HDMI support (module available on M2A-VM HDMI)

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Shuttle XPC 1337 SDXi

The name Shuttle is synonymous with small form factor systems. Its XPC line of products have been winning awards since their inception, and Shuttle seems to continually release more feature-laden SFF systems that coincide with the introduction of new core logic chipsets. But Shuttle's latest XPC, the SDXi, is a slight departure from previous products.

The SDXi is the first member of Shuttle's new 1337 series of high-end XPC systems. The foundation is Shuttle's proven SD37P2 XPC, which is built around the company's P2 series chassis and features Intel's 975X Express chipset. The unit has full support for all current LGA775 processors and Cross-Fire, thanks to its dual PEG slots.

But what makes the SDXi really interesting is its integrated hybrid water/TEC



(thermoelectric cooler) cooling apparatus and flamed-out paint job. CoolIT Systems designed the cooler, which features the company's MTEC technology. The self-contained unit has two waterblocks exclusively for ATI Radeon X1950-class GPUs to quietly keep them cool. Two fans mounted to the radiator exhaust hot air out a vent in the top of the case. Speaking of the case, Shuttle enlisted the help of

Smooth Creations for hand-painted flames and a premium finish as silky smooth as any exotic automobile.

The SDXi is as fast as any desktop system when equipped with similar hardware. With a 2.93GHz X6800, 2GB of RAM, and a pair of X1950 Pro cards, the SDXi put up 83.2fps in Prey at 1,600 x 1,200 with 4XAA/16XAF. And it finished my LAME MT benchmark in 29 seconds and a multithreaded Cinebench 9.5 rendering pass in only 24 seconds.

Its custom GPU cooler and slick paint job make the SDXi the most impressive high-end XPC from Shuttle yet. Just be prepared for price tag that's just shy of \$1,000. ▲

by Marco Chiappetta

XPC 1337 SDXi

\$999

Shuttle

www.shuttle.com



Specs: Processor support: Intel LGA775; Chipset: 975X Express + ICH7R; FSB: 1066/800/533; Memory support: DDR2 533/667 (8GB max); Audio: Realtek ALC882; Gigabit Ethernet; Slots: 2 PCI Express x16 (x8 links); RAID 0/1/5/10/JBOD; 400W PSU

Bigfoot Networks Killer K1

Bigfoot Networks recently launched a more affordable version of its Killer NIC, the Killer K1. When the original Killer (a.k.a. M1) was released, it was praised for delivering higher in-game frame rates and somewhat lower latency, thanks to its custom networking stack and NPU (network processing unit). The NPU took over duties normally reserved for the CPU, freeing up the CPU to handle other tasks while gaming. There was concern, however, that the M1's approximate \$250 price was a bit too much for gamers to swallow when virtually all enthusiast-class motherboards already included at least one Gigabit NICs.

To address pricing concerns, Bigfoot decided to revamp the Killer with a focus on only the features important to gamers (GameFirst, UltimatePing, MaxFPS, and PingThrottle). The Killer K1 differs from the original in that its NPU clock speed is only 333MHz (the M1 boasts a 400MHz



NPU); it also lacks the "Killer K" heat-sink, and support for FNApps is disabled by default. The USB port is still present, and you can upgrade the K1's firmware to enable the FNApps. (The cost of the upgrade wasn't yet established at press time.) The K1 does offer all of the gaming-related features of the original, however, and has the same 64MB of onboard memory.

The K1 performed similarly to the M1, but because of the nature of testing with online gaming, it was impossible to perform a truly direct comparison. Using

an Intel Core 2 Extreme X6800-powered test rig, frame rates in F.E.A.R. and CS: Source increased by 5.1fps and 4.9fps, respectively. But World of Warcraft showed the largest gain—about 8fps. But the K1 really excelled in WoW when numerous characters appeared on-screen simultaneously. It significantly reduced the stuttering that sometimes occurs in WoW in such situations.

At about \$180, the K1 offers similar performance and is roughly \$70 cheaper than the original Killer, so we can't help but like it. But until the K1 is available for even less, it's going to be an uphill battle for Bigfoot. ▲

by Marco Chiappetta

Killer K1

\$179.99

Bigfoot Networks

www.bigfootnetworks.com



Specs: Speeds: 10/100/1000Mbps; NPU clock speed: 333MHz; Memory: 64MB DDR; Interface: 32-bit PCI; Connectors: RJ-45, USB2.0

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

VoodooPC Envy HW:201

The Envy HW:201 is a notebook in name only. At 15-plus pounds, it's light enough to send your rig straps into retirement, but the only business trip you will be taking this system on is your annual BYOC trip to QuakeCon.

The 20-inch LCD is simply astonishing, presenting smooth action in deep, rich colors. Watching movies on it visually rivals any theatrical experience I've had lately. Dual Nvidia GeForce 7950 GTX GPUs (512MB RAM each) in SLI configuration keep the graphics moving fast and smoothly (the HW:201 posted a score of 7060 in 3DMark06), whether you're watching the fiery action of "Blood Diamond" or the fiery blasts of your own hand cannon destroying enemies in your current favorite FPS.

Speed is what this system is about, and the dual-core AMD Turion X2 TL-60 processor is a speed demon. You'll mainly be using the ASWD keys and Spacebar when using the HW:201, but when you do type, you'll appreciate the keyboard's solid response. The optical drive has a solid feel, too.

I noticed a fairly loud click in or near one of the hinges every time I closed the HW:201—not the kind of sound you like to hear from a \$5,000 machine. The other not-so-pleasant sounds I heard came from the speakers during some games and while playing CDs. I tweaked the equalizer, but the audio was generally mediocre without a headset. It was significantly better—good, in fact—when playing movies.

The HW:201 is expensive, and not quite perfect, but if you spend your free time moving from frag party to frag party, this high-class beauty is worth checking out. ▲

by David Finck



Envy HW:201
\$5,000 (\$6,500 as tested)
Voodoo
www.voodoopc.com
● ● ● ●

Specs: CPU: 2GHz AMD Turion X2 TL-60; RAM: 2GB DDR533 MHz; 100GB Seagate HDD; Nvidia GeForce 7950 GTX (512MB RAM, SLI); Display: 20-inch WSXGA+ (1,680 x 1,050); Gigabit Ethernet; Bluetooth; 802.11b/g; 8X DVD+RW; 3-in-1 card reader

Check Point Software Technologies Z100G

Setting up a home or small network is hassle enough. Tweaking and updating firewalls and antivirus programs on every PC can drive you nuts. One potential solution is Check Point's ZoneAlarm Secure Wireless Router Z100G, a speedy, automated, all-in-one product that provides blanket protection for everyone on your network.

There is a built-in firewall (based on Check Point Firewall-1 technology), antivirus and intrusion protection, dynamic DNS, a VPN, remote desktop access, parental Web filtering, and the ability to run four shared printers. Register the router, and your updates for the firewall, AV, and other services are automatic and free the first year. (After that, it's \$69.95 per year. Ouch.) Set-up—if you stick with the defaults—is fairly straightforward, thanks to wizards, a lucid manual, and simple sliders that set security levels.

But buyers beware. The router's default settings don't catch everything. Although the router aced Gibson Research's Shields-Up! security tests, it flunked Gibson's wily LeakTest, which tests a firewall's ability to catch unauthorized outbound messages. And it was easy to download test viruses from Eicar.org. The solution, alas, is digging into the router's configuration screens, writing rules, and fiddling with arcane controls. For comprehensive protection, you must also install ZoneAlarm's Internet Security Suite or a similar package on every PC. Furthermore, I had to wait three days to receive a passcode to download updates for the AV software/firewall. And the only tech support available is through email and on-line chat. That's right, no phone support.

Bottom line: The Z100G isn't quite ready for prime time. If you're network savvy—or have a mixed network with

Macs and older non-Windows XP PCs—it's a steal. If not, stick with the ZoneAlarm software suite for now. ▲

by Robert Luhn



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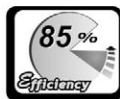
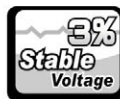
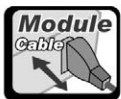
Z100G
\$199.95 (plus \$249.95 for a five-user license for ZoneAlarm Internet Security Suite)
Check Point Software Technologies
www.zonelabs.com
● ● ● ●

Specs: Support for five users; 802.11b/g, Super G; Encryption: WEP, WPA-Personal, WPA2; Ports: Ethernet, 2 USB printer servers (up to four connected printers)

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ● 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

M12

MODULAR 12CM FAN SERIES
500W 600W 700W



With over 30 years of history and experience, Seasonic proudly presents to you M12 modular power supply series. M12 modular carries "Dual Magnetic Amplifiers" technology, which makes cross regulation tolerance on +12V lines that are improved from standard 5% to 3% for optimized stability. Double forward converter design and Active Power Factor Correction provides up to 85% efficiency. High reliability aluminum electrolytic capacitors increase product life and reliability. M12 modular power supply series is the true quality PSU for hardcore gamers and PC enthusiasts.

Corsair Flash Voyager GT 8GB

Consumers can now get into a spacious 8GB flash drive for well under \$100. This is enough room to carry 2,560 6MP digital photos or 2,048 MP3s. To put things to scale even further, Corsair claims its new 8GB Flash Voyager GT drive can fit the entire “Lord of the Rings” trilogy (which amounts to over nine hours of digital video) on a single stick.

Corsair also claims its Flash Voyager GT line is up to five times faster than the average USB key drive, reaching speeds of up to 34MBps and 28MBps on reads and writes, respectively. These sturdy flash key drives come in a tough, rubberized housing, making them both water-resistant and virtually indestructible.



(Survival stories of drives being baked, boiled, or run over by an SUV run rampant, I’m told.) Thrice blessed with looks, brains, and brawn, the Voyager GT was ready to run through my tests.

In SiSoft Sandra XI’s Removable Storage test, I found optimal performance in the 2MB to 64MB file size range, with the Voyager GT topping out at 31MBps on reads and 21MBps on writes. Comparatively, a 1GB OCZ flash drive turned in a max 18MBps on reads and 8MBps

on writes. In a real-world file copy test, I copied a 230MB WAV file to the Flash Voyager GT in 14 seconds; the Voyager GT read it back in nine seconds. Conversely, my OCZ drive took about 36 seconds to write the file and 20 seconds to

read it, which makes the Voyager GT over twice as fast as the average stick, in my estimation.

If rugged, speedy portable storage is your need, Corsair’s Flash Voyager GT series delivers. ▲

by Dave Altavilla

Flash Voyager GT

\$119.99

Corsair

www.corsairmemory.com



Speed: 34MBps (read), 28MBps (write); water- and shock-resistant; 256-bit AES encryption; 10-year warranty

OCZ FlexXLC Edition

Watercooling for computers has become a more mainstream method of cooling than ever before. As such, the market for watercooling products has been expanding. OCZ Technology is taking advantage of watercooling’s new-found hipster image, merging it with its high-end memory products.

OCZ’s FlexXLC watercooled PC2-6400 2GB memory kit is a high-performance memory kit that, like many high-end kits, has integrated heat spreaders clam-shelled on both sides of its modules’ PCBs. Although these heat spreaders are beefier than most, what’s really different about them is that they’re also equipped with a thick waterblock on top of the memory, with integrated radiation fins and 0.25-inch water barbs for splicing, connecting to an existing watercooling system. Water flows along the top side of the sink, cooling the waterblock, and air circulating around the radiator fins cools

the memory the old-fashioned way. The result is a very efficient cooling configuration that is capable of running in either a watercooling setup or with standard air cooling (hence the “Flex” moniker).

These modules are rated for DDR2-800 speeds at 3-4-4-15 timings. They also have what OCZ calls EVP (extended voltage protection), which allows them to operate at a max of 2.4V and remain under warranty.

In my testing, I found the modules ran at their rated speeds and timings coaxed by a voltage setting of 2.2V with only air cooling. I was also able to overclock the kit to 1,142MHz with 5-5-5-15 timings. At 2.3V, the FlexXLC kit turned in its highest clock speed of 1,155MHz.

In any event, connecting a standard Asetek WaterChill setup to the waterblock didn’t actually yield higher overclocks or lower latency settings. On the other hand, temperatures did plummet



21 degrees Fahrenheit on the module PCB and 27 F (116 F down to 89 F) on the module heatsink.

In the end, OCZ’s FlexXLC provided a method to watercool memory. These modules should offer quiet, efficient cooling for increased stability and longevity, but you’ll pay a small premium for them and accept that there isn’t a lot of headroom for overclocking. ▲

by Dave Altavilla

FlexXLC Edition

\$249

OCZ

www.ocztechnology.com



Specs: Capacity: 2GB (2 x 1,024MB); 800MHz; Stock timings: 3-4-4-15 (CAS-TRCD-TRP-TRAS); FlexXLC heatsink; EPP; lifetime warranty

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Should We Be Excited About Apple TV?

I often get asked what I believe will be coming out in the near term that is truly exciting, and these days it's Apple's iPhone that has most of my interest. With the Vista launch come and gone, G80 mature, and R600 no longer as interesting, this year's highlights come down to AMD's Barcelona architecture for my chip-geek side and Apple's iPhone for the gadget freak in me. Inevitably, talking about iPhone brings up another product that many people seem to be confused about: Apple TV.

It's not so much that the product itself is confusing; it's more a confusion of whether they should be excited about it. Apple TV doesn't have the sort of hype surrounding it that the iPhone does, nor should it, as it is admittedly nowhere near as sexy of a device.

Apple TV is a utilitarian device designed to bridge the ever-widening gap between where you store your content and where you'd like to view it. These days, anyone who is computer-savvy ends up having most of his pictures, movies, music, and maybe even TV shows on his Mac/PC. Unfortunately, for the most part that means you're forced to either view the content on your computer or have a TV attached to your computer and view it there. Digital media extenders exist as a category purely to remedy this situation, but results have been mixed. The interfaces are not great, and they don't always work with all types of content.

Apple TV is perfect for the user who downloads a great deal of content off of iTunes and wants to be able to view it on his TV. Clearly there's a similarity then to the iPod, which allows you to take songs purchased on iTunes with you wherever you go. The difference being that the iPod works quite well with music you didn't buy from iTunes, especially music you didn't buy from anywhere at all. And herein lies the problem with most media extenders: It's rare that you buy all of your content from a single source (unless that source is your cable or satellite

TV provider), and most media extenders don't do a great job of accommodating content "acquired" from other sources. Like it or not, the ability to stream pirated content from a torrent or YouTube is important to a lot of users, and the first media extender to do that well is one that will be met with iPod-like success.

With the iPod, Apple introduced the perfect platform to play your pirated music and then slowly but surely attempted to legitimize the device by growing the iTunes Store. While I don't doubt that many iPod owners have songs on their iPods that they didn't pay for, it's the flexibility of being able to steal or buy that makes the iPod a very successful device. With most of these media extenders, you don't have that option. You have to buy into a store that's more than likely not perfect or a video format that represents only a small portion of your content. You're given a laundry list of constraints in which you can use the device without ever having opened the box, and that's not the way to build a blockbuster device.

To date, I believe Microsoft has gotten the closest to the mark with its Xbox 360. The Xbox Live marketplace offers a reasonable UI and approach to downloading video content, and the more adventurous user can use an application such as TVersity to transcode video stored in any format and stream it to his 360 on the fly. The large installed user base of the Xbox 360 makes the solution reasonably pervasive, and combined with Vista's support for streaming content to the platform, it looks to be an early winner. It's still far from ideal, but it's not a bad solution.

Soon I will have an Apple TV to toy around with, and maybe it will prove me wrong, maybe it will be the iPod of media extenders, capable of streaming all of my content to my TV. But right now I have a feeling that it's going to be very useful for the few customers who get all of their video content from the iTunes Store. ▲



Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, CBS' "48 Hours," and Fortune. His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.

Like it or not, the ability to stream pirated content from a torrent or YouTube is important to a lot of users . . .

Talk back to Anand at anand@cpumag.com.

Time To Replace That Laptop

It's been a couple of years—shock, horror!—since I have updated my mobile PC situation. Up until recently, I was running around with a gaming laptop that was very passé by today's standards. In truth, I ended up using the 2-year-old Alienware laptop more for flashing cars than for gaming. In other words, it got slightly dusty; I only used the laptop in high-battery mode to send the odd email and especially for updating the BIOSes of Porsche 996/997TT ECUs (which, funnily enough, use AMD flash chips). Not that I need anything faster for that purpose, but the thought of not being able to play Quake 4 at 1,920 x 1,200 with some antialiasing and anisotropic filtering turned on was too much to bear. So, updating my mobile PC had something to do with that thought, and, perhaps, the fact that I wanted to sample Nvidia's new mobile gaming chip, the GeForce Go 7950 GTX.

I use "mobile" in the loosest possible way here, as the Inspiron XPS M1710 is more of a desktop replacement if anything. Turning the odd wrench now and again means I no longer have wimpy arms, so lugging 8 pounds of Inspiron around isn't a problem. The chassis isn't only durable but also customizable (red or black), as are the LED colors for the logo and fans. The keyboard and general layout is as ergonomic as ever—you would expect nothing less from Dell. On the driver's side (left side) there are a pair of USB ports and a "cold air" intake for cooling. You can populate the optical drive bay with either an 8X dual-layer DVD±RW drive or, better still, a BD (Blu-ray Disc) player if you can stomach the upcharge. The 17-inch WUXGA display's native resolution is 1,920 x 1,200, which matches perfectly with the BD mode. If you already have a BD setup at home, don't expect it to be quite as spectacular on a small screen, but it makes for interesting conversation with the passenger next to you watching his standard DVD version of the same movie on the

4:30 p.m. flight from LAX to SJO. The passenger side (right) of the XPS M1710 harbors an ExpressCard expansion slot, FireWire port, audio jacks, and a nifty 5-in-1 memory card reader. The rear end of the laptop sports the usual S-Video out, modem (please go away!), Ethernet, 15-pin D-sub, DVI (very nice), and four more USB ports.

For the motor, I chose to go with Intel's Core 2 Duo T7600G using the 945PM chipset along with a couple of 1GB DDR2 667MHz memory sticks. The CPU itself is clocked at 2.33GHz with 4MB of L2 cache running on a 667MHz FSB. The interesting point here being that Dell chose to leave the CPU clock multiplier unlocked for more overclocking fun (3GHz seems to be fine). Nvidia's new 512MB GeForce Go 7950 GTX is an expensive option but well worth it for gaming-heads like myself. With this much power running a few Quake 4 tests, I was able to get frame rates in the 80s at 1,920 x 1,200. Battery life obviously isn't the greatest with this type of platform, but with a 9-cell in there, BatteryMark came in at 175 (which was about 20 short of my old laptop).

Dell limits hard drive options if you want the faster 7,200rpm SATA drives, so 100GB is as much as you can get, which isn't really enough. The wireless options are plenty with Dell including an Intel 3945 802.11a/b/g wireless card. The laptop even supports the 802.11n draft 1.0 standard and, in theory, will be able to handle 270Mbps using MIMO technology.

Gaming and notebooks in general have never been cheap hobbies. Put the two together, and you won't find the words "value for money" in radio range. By the time I was done spec'ing out my XPS M1710 system, the total price was just a couple of clicks south of four grand—ouch! Hopefully this new laptop will last a couple of years before I retire her, too, into flashing and diagnosing cars. ▲



Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/labuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently overclocks/tunes Porsche 996 Turbos with www.sharkwerks.com when he's not tweaking PCs.

Gaming and notebooks in general have never been cheap hobbies. Put the two together, and you won't find the words "value for money" in radio range.

Email me at sharky@cpumag.com

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PC Modder

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

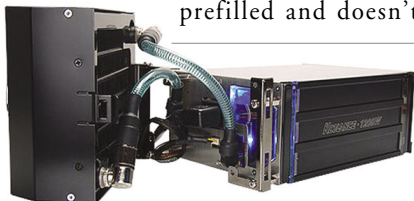
Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

Mods & Ends

Koolance 1200W Liquid-Cooled Power Supply

Hardcore enthusiasts in the market for an equally hardcore power supply need to see Koolance's 1,200W liquid-cooled power supply. The Koolance PSU-1200ATX-12S (\$499) can output up to 85A of current over its four 12V rails. It features modular cables and four PCI Express connectors for SLI and CrossFire support. The PSU is capable of supplying 1,200W of continuous power and 1,400W of peak power at greater than 80% efficiency, all while its guts are completely submerged. Koolance claims this patent-pending design is superior to traditional liquid- and heatpipe-cooled power supplies because all of the PSU's internal electronics are immersed in a nonconductive fluid; an external heat exchanger dissipates the heat.

The Koolance PSU-1200ATX-12S is prefilled and doesn't



The internal components of Koolance's 1200W Liquid-Cooled PSU are completely immersed in a non-electrically conductive fluid.

require regular coolant maintenance. (But you will have to add more coolant over time.) It also features a quiet, 120mm, LED-lighted fan that's temperature-controlled and operates between 25 to 33dBA. According to Koolance, the PSU-1200ATX-12S is compatible with most ATX, E-ATX, and BTX chassis with 9-inch power supply depths. The external heat exchanger is adjustable to support a broad range of chassis.

Scythe Andy Samurai Master CPU Cooler

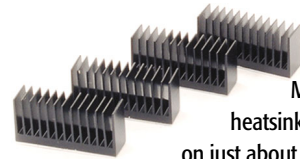
Scythe recently introduced a universal, high-end heatsink and fan for Socket 478/775/754/939/940/AM2 systems dubbed the Andy Samurai Master (\$54), model SCASM-1000. The massive heatsink and fan assembly measures 12.4 x 13.5 x 12.5 cm (HxWxD) and weighs in at a hefty 685g. The main feature of Scythe's Andy Samurai Master cooler is Scythe's IIFS (Infinity Interleave Fin Structure) technology, which is essentially a combination of large heatsink fins for maximum surface area linked to six heatpipes designed to quickly dissipate heat from the CPU. The Andy Samurai Master also features a 12cm, sleeve-bearing cooling fan that can move up to 49.58cfm at just under 21dBA and a newly developed, patent-pending mounting mechanism. The VTMS (Versatile Toll-Free Multiplatform



Scythe's Andy Samurai Master cooler has a massive surface area and a large 12cm cooling fan.

System) gives users the ability to install the Andy Samurai Master CPU Cooler without using any tools.

Swiftech MC21 MOSFET Heatsinks



Swiftech's MC21 MOSFET heatsinks will work on just about any surface-mounted components.

The Swiftech MC21 MOSFET heatsinks (\$9.95, 4-pack) are small, black anodized aluminum heatsinks designed to cool surface mount components such as MOSFETS. Swiftech initially designed them to fit on Nvidia's GeForce 8 series graphics cards, but you can easily install them on motherboard MOSFETS or any other surface-mounted IC in need of passive cooling. The MC21 heatsinks measure 0.393 x 0.825 x 0.236 inches and weigh only 0.1 ounce each. They're mounted with thermal conductivity adhesive tape.

Fashionably Fresh Firmware

Netgear WNR854T RangeMax Next Router (v1.4.09)

An update for the router adds support for three new wireless modes—Up to 54Mbps, Up to 300Mbps, and Up to 145Mbps.

www.netgear.com

Samsung SH-M522C (VTS08)

Samsung recently released an update for the SH-M522C internal CD-RW/DVD-ROM combo drive that improves compatibility with DVD-R media.

www.samsungoms.com

Nikon D40 Digital SLR Camera (v1.1)

A new firmware update for Nikon's D40 D-SLR camera incorporates a large number of fixes. The update fixes an issue that disabled the ISO auto feature and certifies the camera for Windows Vista by adding support for the new USB MTP (Media Transfer Protocol).

support.nikontech.com

by Marco Chiappetta

POWER, UNLEASHED

SEALAXY

DxX

1000W

 X3 PCI EXPRESS  X2
6P PCI-E 6+2P PCI-E



The first 1KW EPS PSU with Five +12V Rails

The Galaxy DxX series is specifically made for hard-core gamers and those who demand nothing less than perfect. An amazing 900W of combine power for the most extreme Graphics setup you can imagine and it's quad core ready. The DxX also support the upcoming 8Pin PCI Express 2.0, delivering maximum power to the next generation of monster graphic cards.



PHOENIX

3.0mm diamond-cut and hair-brushed aluminum. The first front access micro dust filter with aluminum CD-ROM flip covers integrated.



GLORY

1.5mm aluminum body and internal noise dampening keep this box quite and cool. The one button back up make backing up a snap.



AURORA

Heavy Duty all aluminum keyboard with a sleek slim design. Design with scissors key technology for ease of use and a built in USB port.

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mwave

PC CLUB

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DIRECTRON.COM

The Ultimate HTPC

This One Does It All

We've talked at great length about home theater and Media Center PCs over the years. We've even dedicated a few articles to recommending parts for building home media servers in past issues, but it's been quite a while since we've assembled our own HTPC. We thought it was time to gather up the necessary components for a high-end HTPC and detail the steps necessary to actually build the machine.

There are a number of things to consider when selecting the parts for an HTPC that don't necessarily apply to a standard desktop system. For one, a beige midtower isn't going to look so hot next to an entertainment center full of black A/V equipment. And silence is usually of the utmost importance because HTPCs tend to be located in a central living area where the hum of a dozen case fans can become annoying real quick.

But it's not always possible to build a near-silent HTPC if the machine will also be used for gaming or serving up files to multiple users 24/7. Obviously you'll have to make concessions to assemble an HTPC that strikes a balance between your performance, acoustic, and aesthetic needs.

Pick The Parts

Before purchasing a single component for our HTPC, we sat down and made a list of our intended uses for the machine. We consider this an important first step because it will help you make intelligent buying decisions; there's no need for a high-end video card if you won't use the machine for gaming. And if the system isn't going to act as a media server, you may be able to save a few dollars by going with a modestly sized hard drive. In addition, the list will help you

map out specific features, which makes it a bit easier to target certain components when shopping.

Our machine was going to serve triple duty. It would be used as a PVR, for gaming on a big screen, and for serving/storing music, movies, and digital photos for a number of users. We also wanted to run Windows Vista and ready the machine for the impending onslaught of DirectX 10 games. We'd need some fairly powerful hardware for all this, but we didn't want to break the bank, or build an ultra loud machine.

We began by selecting a case. We wanted something sleek and unobtrusive—a case that, at first glance, wouldn't even look like a PC. It also had to be affordable and able to accommodate a standard ATX motherboard and full-sized video card. We chose Silverstone's Lascala LC-10 because it met all of our criteria and was available for a budget-friendly \$99. (*NOTE: For a wide selection of HTPC cases, see "Fit For The A/V Rack" on page 20.*)

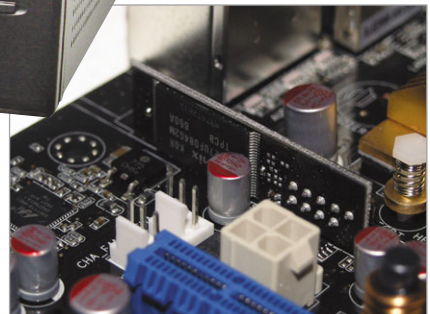
As for the video card, we knew it had to be ready for DX10 and have enough

horsepower to game at HD resolutions. Because of space, noise, and budget constraints, an Nvidia GeForce 8800 GTX was out of the question. But the relatively new GeForce 8800 GTS 320MB would be a good fit, so we snagged one for this build. As an added bonus, the 8800 GTS features Nvidia's latest PureVideo HD engine and supports HDCP, which make it a good choice for playing HD content.

Our motherboard choice ultimately helped us determine which processor we used for this project. We had a specific list



We planned to cram a GeForce 8800 GTS 320MB, a couple of hard drives, a DVD-R, a dual TV tuner and a host of other components into a Silverstone Lascala LC-10 enclosure.



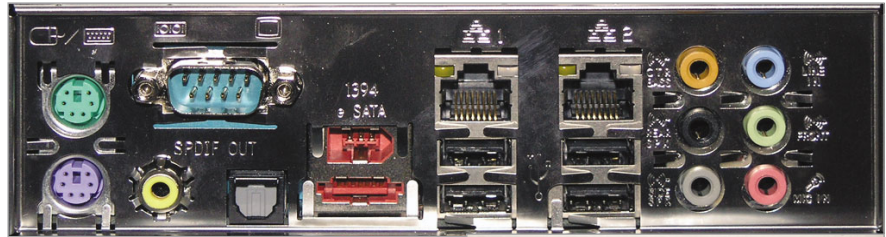


We incorporated quite a few mods into our HTPC. The Silverstone case included a part to disguise the DVD burner. We lapped and polished the CPU and heatsink and neatly bundled all the cables for better cooling.

of features for the motherboard we wanted to use in this PC. It needed passive cooling and had to be completely silent. It also had to have good integrated audio, an eSATA port for backup purposes, FireWire, Gigabit Ethernet, at least two standard PCI slots, and case fan speed controls in the BIOS. Not surprisingly, this list of features limited our choices considerably.

In the end, Asus' M2N32-SLI Premium Vista Edition met all of our needs and then some. This motherboard includes a nifty LCD dubbed the "Screen Duo" that gives users the ability to access useful data without fully powering up their system, and it's also outfitted with a 512MB high-speed flash drive that's compatible with Vista's ReadyBoost feature. Finally, the M2N32-SLI's ADI audio codec is superior to the Realtek codecs that dominate the market.

Initially, we had planned to use an Intel Core 2 Duo processor, but our choice of a Socket AM2 motherboard obviously forced a change of plans. After browsing through current Athlon 64 X2 offerings, the 5000+

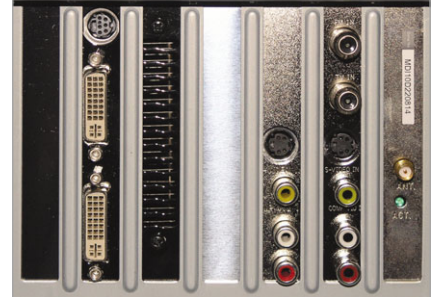


seemed like the sweet spot. Despite a higher clock speed, it was available for less than the 4800+, and it would be plenty powerful for gaming and video encoding. And with Cool 'N' Quiet enabled, it'd be power-friendly while idling, too. To compliment the CPU, we also picked up a Zalman CNPS 9500 AM2, which could easily handle the 5000+'s thermal output without generating too much noise.

Next, we focused our attention on storage. The current crop of next-gen BD (Blu-ray Disc) and HD DVD drives leaves a lot to be desired. And they're expensive, too, so for now, we stuck with a standard DVD drive. While shopping for components, we came across a deal on a Samsung Super-Writemaster SH-S183L, so we snatched it up. The drive's SATA interface eliminated bulky ribbon cables inside the PC.

We initially intended to set up a RAID 5 array, but keeping four hard drives quiet in a relatively small home-theater enclosure (if they would even fit) wasn't feasible. Instead, we opted for a couple of fast drives and would back up our data to a pre-existing NAS device. We chose a Seagate ST3250620AS 250GB drive for the OS and applications and a ST3500630AS 500GB dedicated only to media. 750GB of total storage would be enough for a fairly large media collection. Plus, splitting up the OS and media drive builds in some level of redundancy and spreads the workload between two devices. If the OS drive fails, the media will remain intact; if the media drive fails, the system will still be accessible.

The next addition to our HTPC was a TV tuner card. Because we wanted to have the ability to watch one channel while recording another, we needed either two tuners or a single card with dual tuners. In the end, we came across Hauppauge's Win TV PVR-500. This card was a good fit for our HTPC because it incorporates dual tuners, an FM radio



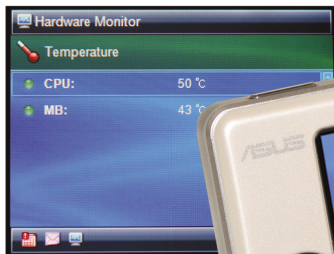
The combination of the Asus M2N32-SLI Premium Vista Edition motherboard, Hauppauge WinTV PVR-500, and a wireless NIC offered a wide array of connectivity options, including eSATA, FireWire, and two sets of composite and S-Video ports.

tuner, and two sets of composite and S-Video inputs and outputs. The card gave us all of the functionality we desired and was relatively affordable.

The final components for our HTPC were RAM, a PSU, a wireless NIC, and a standard Media Center remote. We didn't plan to do any overclocking, so standard DDR2-800 RAM and a modest PSU would do. Of course, quality was still a concern, so we opted for Corsair's TWIN2X2048-6400 2GB kit and a relatively quiet OCZ ModStream PSU. To compliment the motherboard's dual Gigabit wired NICs, we added a Linksys PCI WMP54G 802.11b/g NIC. Lastly, we incorporated a standard Media Center remote to make it easy to use the machine from across the room.

Assembly & Modifications

Aside from the orientation of the drives in the Lascala LC-10 case, assembling the media center PC wasn't much different than a standard desktop system. We won't bore you with the specifics but would like to point out some basic mods we performed to give the machine a bit of custom flavor.



The Asus Screen Duo is a perfect accompaniment to a media center or HTPC. It gives users the ability to browse images, change audio or video tracks, and check the PC's vitals, among other things, without having to fully power up the machine or touch the keyboard and mouse.

The case included a stealth drive bay cover to disguise the optical drive. To install the stealth drive bay cover, we had to mount the optical drive, line it up with the case's eject button, and secure it into place. Then, with everything fitted, double-sided adhesive foam held the cover in place.

We also modded our CPU and Zalman cooler to ensure good mating surfaces, which would enhance cooling. Because the base of the cooler was already perfectly flat and well-polished, we only spent a little time with a wadding metal polish to buff it to a perfect mirror finish. The CPU's integrated heat spreader was also nice and flat, but it needed quite a bit of polishing to bring out a mirror finish. We did some lapping with fine-grit sandpaper (1,500 grit) and moved to the metal polish to perfect the finish. When we were done polishing, we applied a bit of quality thermal paste to the CPU and installed the cooler.

Because our HTPC would be in a central living space, the quieter it was, the better. By installing sound-deadening material, we could reduce vibrations and make the system just a bit quieter. Installing the sound deadening material is easy and requires nothing more than a sharp razor to cut it to size. First we cleaned the inside of our case cover with some alcohol-based cleaner, and then we molded the deadening material into shape. We used our razor to cut it to size, removing material over the cases ventilation holes. Then we simply peeled the protective layer from the deadening material's adhesive backing and stuck it in place.

Lastly, we spent a great deal of time neatly bundling wires and routing cables

within the case. Every cable was tied, folded, or tucked out of the way so air could flow through the case unhindered. We know this sounds like tedious work, but good cable management will result in better cooling, lower temperatures, and even a quieter system, because there's less turbulence inside the system.

When everything was assembled, the components in this build offered a nice assortment of connectivity options, including eSATA, FireWire, coaxial, and two sets of composite, S-Video. We had dual DVI and, via a dongle, HDTV outputs on the video card for display options.

Configure The OS

With the system fully assembled, it was time to install the OS. We chose Windows Vista Ultimate for several reasons. Its support of DX10 and built-in Media Center software were key, but Vista Ultimate also gave us an image-based backup utility and support for BitLocker drive encryption. First, we used another PC to gather up all of the drivers necessary for our components, saved them to a flash drive, and started the Vista installation.

When it was done, we installed our drivers, updated Windows, and configured Media Center. We expected this final part of the build to be relatively difficult and planned to detail the speed-bumped encounter along the way, but, somewhat surprisingly, we didn't encounter a single glitch. Vista recognized our TV tuner and integrated audio right out of the gate, and the Asus Screen Duo and Media Center remote also worked immediately. The sum total of our efforts was an HTPC that was ready for any application we could throw at it. ▲

by Marco Chiappetta

Parts & Prices

Here's a comprehensive list of all of the parts we used to assemble our high-end HTPC. Think of this as a template you can tweak and modify for your particular HTPC. Don't need a DX10 video card or high-end processor? Substitute our choices for different products and adjust the prices accordingly.

Processor	AMD Athlon 64 X2 5000+	\$215
Motherboard	Asus M2N32-SLI Premium Vista Edition	\$235
Video Card	Asus EN8800GTS/HTDP/320M	\$300
Sound Card	Onboard	\$0
RAM	Corsair TWIN2X2048-6400	\$200
TV Tuner	Hauppauge WinTV PVR-500	\$139
Case	Silverstone Lascala LC-10	\$99
CPU Cooler	Zalman CNPS 9500	\$45
Optical Drive(s)	Samsung SH-S183L	\$39
Hard Drive(s)	Seagate ST3250620AS 250GB, Seagate ST3500630AS 500GB	\$75 \$149
Power Supply	OCZ ModStream 520W	\$80
Miscellaneous	Media Center Remote Linksys WMP54G Dynamat (sound dampening)	\$38 \$45 \$30
Operating System	Windows Vista Ultimate Upgrade (OEM)	\$189
Total:		\$1,878



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Vista has ARRIVED

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To experience the stunning visual effects of the Windows Aero user interface, along with other graphics intensive functionality within Vista, Newegg recommends a Video Card with at least 256MB of Graphics Memory and support of Direct X9.

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Mad Reader *MOD*

Overkill

If you've been to a major LAN party lately, you know that modding isn't the passion of just a few computer enthusiasts. Skilled modders regularly show off their rigs at LAN parties and inspire others to open their computers, take stock of what's inside, and figure out how to make their systems look and perform better.

For this month, we shook up our standard mod selection process. Instead of sifting through the mods that flood our madreadermag@cpumag.com mailbox, we flew to Portland, Ore., home of the popular PDXLAN LAN party. We saw some fantastic mods, including a treasure chest PC and a "Buffy the Vampire Slayer" tribute mod. (You can check these systems out on page 44.)

As much as we liked those rigs, Overkill stopped us in our tracks. This 24.5-inch-tall, custom-built beauty lives up to its name with an oversized radiator, no fewer than eight 120mm fans, and some heavy-duty components, including a 2.93GHz Intel Core 2 Extreme X6800 and two 640MB BFG Nvidia GeForce 8800 GTS OC2s in SLI. The system includes 74GB and 150GB Western Digital Raptor 10,000rpm hard drives and a 750W SilverStone Zeus ST75ZF power supply.

Overkill also has some waterblocks that aren't yet on the market, thanks to its builder, Dennis "DeadGuy" Leach. Leach is the COO of watercooling supplies maker Danger Den, which is also located in Oregon. He used Danger Den's laser to cut the case's acrylic panels. "This case was built around the radiator," says Leach. "When I first got one, I could not believe how big it was. I knew no one made a case that it would fit in, so I just had to build one." ▲

by Joshua Gulick

"When gaming, I use the name DeadGuy, the case is called Overkill, so the Grim Reaper image just fit the theme," says Leach. "The image is reversed on the back side so you get a mirror effect when you look through the clear side."

Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermag@cpumag.com. We're looking for rigs that are recognizable as PCs; your Wookiee mod won't find a home here. If we include your system in our "Mad Reader Mod" section, we'll help you load up your modder's toolbox with \$1,500 and a one-year subscription to *CPU*.

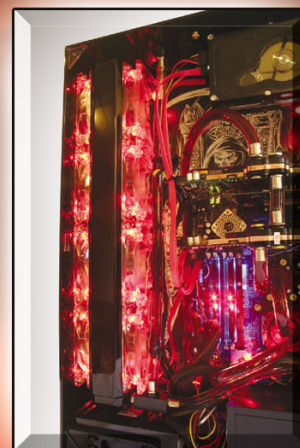




Leach used red Logisys fans, lights, and Integrity PC Systems Blood Red Fluid XP+ EXTreme liquid coolant to give the system its sinister red glow.



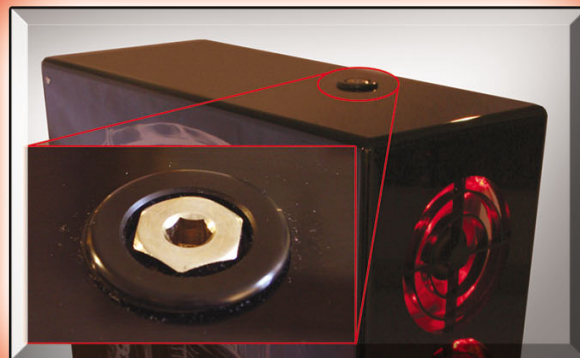
If you look at the corners of the case, you'll notice dark acrylic triangles. Leach used these to strengthen the case and to hold the bolts that secure the side panels.



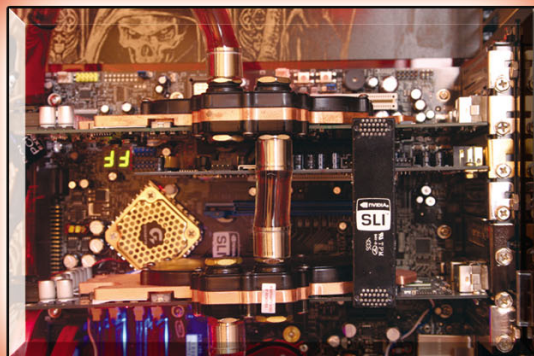
Fans on both sides of the radiator suck cool air from outside the case and then force it to the back of the system, which has large exhaust vents.



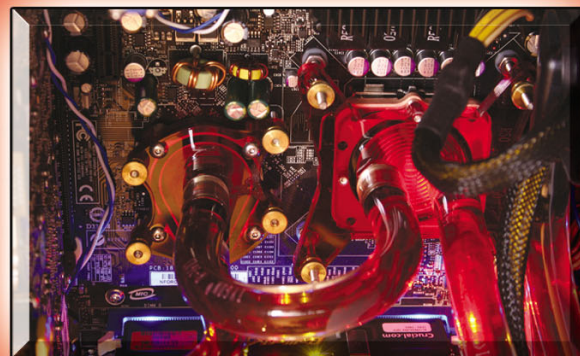
The hard drives sit near the top of the system. Leach tells us he placed the hard drives here so they'll benefit from the radiator's airflow.



"The fillport is a Danger Den-invented product to add fluid to your system without having to remove the side covers," says Leach.



Leach used Tygon hosing in this watercooling system. The hose is thick, preventing kinking.



These not-yet-released Danger Den waterblocks have red acrylic tops.

(LAN) Party Time

PDXLAN Hits A Home Run



The runners-up landed some great prizes, including motherboards and power supplies, but the winner took home \$1,500 and this issue's cover.

A super-fast network, tournaments, food, and dozens (or even hundreds) of attendees and their computers: The well-organized LAN party is a gamer's dream come true.

LAN parties both large and small take place every month, letting casual and

hardcore gamers chat, play their favorite games, and swap tips and tricks. You'll find the parties at hotels and conference centers in cities across the country, including Portland, Ore., which is home to a particularly well-known 500-man LAN: PDXLAN.

CPU recently visited (and was one of the sponsors of) PDXLAN 9, a sold-out party that saw four days of gaming madness. We held a modding competition, chatted with attendees, spent way too

much time gaming, and asked PDXLAN staff the sorts of hard-hitting questions you'd expect from seasoned tech journalists, such as, "So, exactly how much pizza do you guys eat at PDXLAN?"

The Birth Of A LAN Party

PDXLAN is Matt "Vector" Conwell's baby. The charismatic LAN director cooked up PDXLAN while working on an MBA at George Fox University. "The idea was to come up with an idea for a business and then write a marketing plan for it," says Conwell. "I took the project a little more seriously and decided to actually implement the idea."

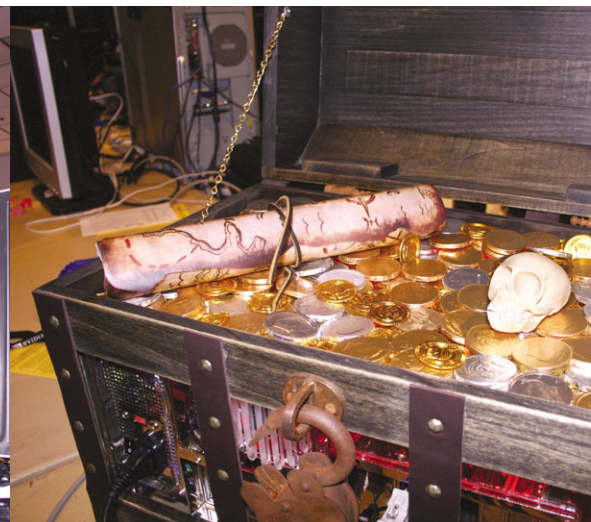
With one exception, every PDXLAN has taken place at the Airport Holiday Inn in Portland. The event's layout this year included rows of long tables for gamers and their rigs, an Intel-sponsored section that boasts dozens of high-end gaming PCs, a beanbag relaxation station sponsored by Connect 3D, and a massive stage that was home to PDXLAN's 24/7 help desk, servers, and staff. "The PDXLAN staff is made up of 20 to



Dennis Leach, one of the founding members of Danger Den, shows off his custom-built rig, Overkill. As winner of our Mad Reader Mod competition, Leach won an Intel Core 2 Duo E6700, a Corsair Dominator RAM kit, a check for \$1,500, and a one-year complimentary subscription to *CPU*. Best of all, he gets to see Overkill rock the cover of this month's issue.



If you're a Buffy fan, you'll love this mod. Richard "DarthBeavis" Surroz built this slick rig in a Mountain Mods case and even added Buffy's weapon.



Arrr, matey! Joe "CyberCrist" Szupiany's detailed treasure chest PC caught our attention right away. If only those were chocolate gold coins. . . .



Mark Klebowski built his system from scratch. The small PC has a slot-load optical drive and plenty of neat features. Klebowski even modded the video card's bracket to provide better airflow.



If you're tired of playing at your own computer, you won't have any trouble finding systems sponsored by part manufacturers.

25 intelligent volunteers," Conwell tells us. "Many of these are college students, some work in IT, and some think they are pirates."

PDXLAN's network runs on the backs of six PDXLAN-owned 3.2GHz dual-core Intel Xeon-based servers, as well as 12 more provided by Intel. The servers handle gameplay and host a variety of LAN-related files, including game patches and drivers. PDXLAN provides each table with a 24-port D-Link switch that uplinks to the network core.

Pay To Play

Gamers pay \$60 per person to attend the four-day LAN party. Your ticket buys you a seat at one of the tables (with 3 feet of table space), a power connection (3.5 amps), a water bottle, and unlimited soda. That's right. You can fill up your water bottle with Mountain Dew any time you please. The 3 feet of table space gives you plenty of room to set up your computer and monitor. "All attendees also get raffle tickets for our prize raffle, where they can win video cards, RAM, power supplies,

cases, monitors, processors, all sorts of good stuff," says Conwell. "We usually have about \$75K in prizes for each event we do."

Although the LAN party holds tournaments for popular video games, PDXLAN also fosters a sense of community among the players. "What I like about LAN parties is the community aspect. 10, 20, 100, 500 geeks getting together with a common interest to kill one another," says Conwell. PDXLAN 9 also hosted non-video game contests, including a Crucial-sponsored 300-man dodgeball game and hard drive



Ah, there's nothing like a good game of dodgeball . . . with hundreds of people. Memory maker Crucial sponsored this classic.



PDXLAN offers plenty of swag in the form of T-shirts and prizes that the staff raffles off during the event.

PDXLAN Stats

PDXLAN 9's staff and attendees produced some impressive numbers during the four-day gaming spree.

1	Combined length, in miles, of extension cords
3	Combined length, in miles, of Ethernet cables
30	Number of 24-port switches
135	Gallons of Bawls energy drink ordered
250	Number of sub sandwiches ordered
376	Number of large pizzas ordered
750	Gallons of soda ordered
936	Number of Krispy Kreme doughnuts ordered

Each PDXLAN event includes a food-eating contest. Here are the fastest times for the contests from the past four events (minutes:seconds):

3:07	Large pizza
4:00	18 Twinkies
3:12	6 Costco poppy seed muffins
1:09	18 Peeps

Source: PDXLAN

shuffleboard. Several of the repeat attendees told us that they'd made friends with other players here at PDXLAN and that they attended as much to catch up with friends as to play in tournaments.

Mad Reader Mod

PDXLAN has always hosted modding competitions. This year, *CPU* co-sponsored the tournament, selecting the top five mods entered in the contest. All five modders received prizes, including Dennis Leach, whose first-place prize package included a

spot on the cover of *CPU* for his Overkill mod. Leach is a founding partner of Danger Den, which makes watercooling supplies. In fact, Leach is the "Den" in Danger Den. He and the other two founders, Dan Stephens and Jeremy Burnett contributed their first names (phonetically, in Jeremy's case) to create the company's name.

Modding is clearly catching on at PDXLAN. Conwell estimates that 90 to 95% of the computers at PDXLAN 9 had some type of modification, and many of those were showstoppers. We were particularly

impressed with Mark Klebofski's mod. He soldered wires to the back of his tiny PC's motherboard to keep the top half of his custom PC uncluttered.

PDXLAN 10

In case all this LAN party talk has your inner geek raring for some gaming action, PDXLAN 10 starts August 31st and runs through September 3rd. It's time to dust off the ol' computer. ▲

by Joshua Gulick



These blazing-fast Intel notebooks and desktops handled many of the LAN party's tournaments.



This working vintage radio (complete with tubes) also houses a PC. It's modded to the gills, of course.



Kory "Masolik" Schuff's custom, watercooled system saves space by towering over the monitor. Our designer got a kick out of seeing our logo in the correct font.

Welcome to California, Dude



This is California? Home of beach babes and surf contests? It might surprise you that California is also the home of snow bunnies and championship ski runs. Just like it might surprise you that Antec's world headquarters is located in California's Silicon Valley, the heart of technological innovation. Our unique California spirit of performance and originality help make Antec's products market leaders. Like our all-new Nine Hundred advanced gaming case or our environmentally friendly EarthWatts power supplies. So whether it's snowboarding or silicon chips or silent PC cases, think California. Think Antec. Think the Power of You.

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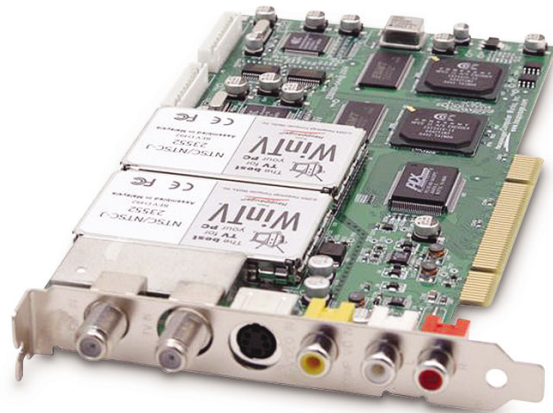


Get informed answers to your advanced technical questions from CPU. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

“ To save space,
I was thinking about
using a TV as a
monitor so I can
have my computer,
Xbox, and Wii
all in one spot. ”

Each month we dig deep into the mailbag here at CPU in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable? CPU's "Advanced Q&A Corner" is here for you.

Andrew C. asked: I'm switching schools and the new dorm room I'll be moving into is really small. To save space, I was thinking about using a TV as a monitor so I can have my computer, Xbox, and Wii all in one spot. Someone told me that if I do that, though, the resolution is going to really stink and I won't be able to type papers and stuff like that. I don't need anything fancy, but I don't want to go blind writing papers on a TV, either. Is there an adapter I could buy to hook up my TV cable, Xbox, and Wii all to my computer monitor? I have an old 17-inch monitor that came with my Dell PC. Thanks!



Many TV tuner cards have composite and S-Video inputs, which let a user connect things such as game consoles or set-top boxes directly to his system.

A: It may seem like what you want to do is extremely complicated, Andrew, but it isn't. There are two really easy ways to do what you're asking: One way is relatively inexpensive, and the other requires you to purchase a new monitor. The most cost-effective way to turn your computer into a TV, complete with multiple video inputs, is to install a TV tuner card. There are a number of tuner cards from companies such as ATI, Leadtek, and Hauppauge that have F-type TV cable inputs and a couple of composite and S-Video inputs for your consoles. If you go this route, you'll be able to keep all of your existing hardware and just plug the TV tuner card right into an available PCI slot in your system. When you want to watch TV or play games on

your consoles, it will be simply a matter of firing up the included tuner application and selecting the appropriate input. Basic TV tuner cards are available for under \$50 with an F-type input and at least one composite or S-Video input. Cards with multiple tuners and two or more video inputs, however, will be about double or triple that price. Also, keep in mind these cards will only tune basic cable and not any premium or HD content.

There's another way to hook up all of your consoles to the system and gain TV functionality, as well, but you'll have to purchase a new monitor or TV. If you go with a TV, however, make sure it's HD-capable and has a DVI input; SD won't cut it. But perhaps the best way to go would be to purchase a new monitor, such as Dell's 2407WFP. It's an expensive option (more than \$600), but Dell's 2407WFP has VGA, DVI, composite, S-Video, and component inputs. With the 2407WFP, you could connect your system to the VGA or DVI input and your consoles and cable box to the others. To switch among them, all you would have to do is press a button on the front of the display that will cycle through the inputs. This method will likely be the most expensive, but you'd end up with a killer monitor and all of your consoles and cable TV connected in one place. One downside to this approach—other than the cost—is that you'll need a separate audio amplifier with inputs for sound output for your devices.

Paul P. asked: I have two SATA Raptor 10,000rpm 74GB hard drives in my PC right now. (I already had one in my PC and added a second recently.) I would like to set them up so that I can access each one individually. I don't want RAID, just two separate drives with a total of 148GB of storage. I've hooked up both drives, but only one of them is showing up in Windows. I've tried moving the jumpers in every possible way, and they still don't work. When I boot up and when I'm in the BIOS, the PC lists both drives. It's just in my OS (Windows XP Pro) that I can't access the second one. I would appreciate any help you could provide.

A: There are very few instances where you'll need to mess with the jumpers on a SATA hard drive; they aren't like the PATA drives of old where you have to designate a master and a slave device. You usually don't have to change anything on the SATA drives themselves. And the jumper on the 74GB Western Digital Raptor you mention is only for altering the power state of the drive on bootup. You may have to change some settings in your BIOS, however, to configure your SATA controller for normal operation. Some controllers default to RAID mode, but because you didn't mention anything about the drive being listed in your motherboard's RAID BIOS, we'll assume that's not the case.

We suspect you bought a second drive, plugged it in, and boot-into Windows thinking you could access it. But without partitioning the drive or assigning it a drive letter, you won't be able to access this second drive. To partition your second drive and assign it a drive letter, click Start, right-click My Computer, and then select Manage from the drop-down menu. This will bring up the Computer Management window. In the left pane, click Disk Management and you should see all of the drives connected to your PC. If your new drive is listed, right-click it to create a partition (select New Partition from the drop-down menu), make it active (from the drop-down menu, select Mark Partition As Active), and assign it a drive letter (select Change Drive Letter And Paths from the drop-down menu).

Mitch asked: I'm looking to buy a new Intel processor and motherboard combo. I realize that for a mere \$1,000 the QX6700 is more future-proof, so I'm leaning toward that, but I'm a little concerned about the heat factor. I'd like to bump up the QX6700's speed to the 11X multiplier (QX6800), but I'm worried this will really crank up temps for the whole system. I plan on using:

Lian Li PC-7B Plus II case

1 GeForce 8800 series graphics card

1 150GB WD Raptor hard drive

Zalman ZM600-HP 600W PS (minimum)

Zalman CNPS9500 or CNPS9700 LED HSF (Which do you prefer?)

I want to be well-prepared for UT2007, Crysis, and other next-generation games, as well as Vista and DirectX 10. I also don't like upgrading

Intel's Core 2 Extreme QX6700 puts off some heat, so be sure to have a well-ventilated case and a good PSU.



my motherboard and CPU if I don't have to. It's much easier to upgrade a graphics card than a motherboard/CPU. What are your thoughts, and is heat that big of a concern with the Core 2 Extreme QX6700? The chip specs indicate about 150W TDP at 2.93GHz. That seems like it's a little high for my case spec and my heavy graphics card power/heat profile.

A: Great system specs there, Mitch. We would definitely go with one of Intel's new quad-core Core 2 processors. Intel has recently come out with less expensive, lower speed bin quad cores (such as the Q6400 and Q6600) that you can overclock. We wanted to note this because, as you pointed out, the QX6700 still costs about a grand. But if you have money to burn, go for it because you will not be disappointed.

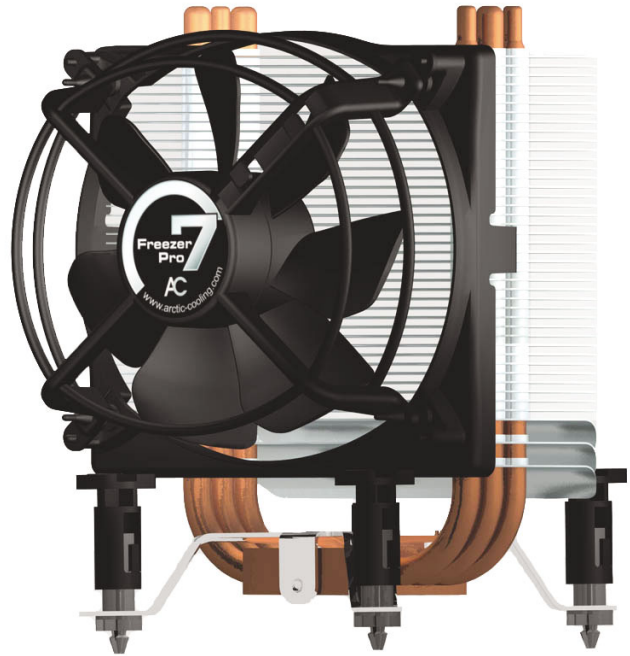
As for the Zalman HSF question, we like the CNPS9700 and have run it in the HotHardware.com labs with a QX6700 overclocked. It does 3.3GHz like a walk in the park. At speeds close to 3GHz or 3.1GHz, we didn't even need to bump voltages to maintain stability with this HSF cooling things down. If you have a decent, well-ventilated case, heat shouldn't be that much of a problem. The only thing we would suggest is a beefier PSU for future growth possibilities. You could try something in the 850W range. Thermaltake has some new PSUs in this range that have the capacity for you to even upgrade to dual GeForce 8800 series cards in SLI, if you really want to go hog wild in the future. These Thermaltake PSUs are nice and quiet, too, with single, large 140mm exhaust fans.

Ron B. asked: I built a new system that has a Core 2 Duo E6700, an Intel D975XBX motherboard, 4GB of OCZ 6400 DDR2 RAM, two 320GB SATA hard drives, and an ATI All-In-Wonder X1900. I recently ran an office diagnostics program that reported memory problems, so I downloaded Memtest86 (version 3.2), which also identified problems with one of the 1GB RAM modules. I replaced that module. Memtest86 then identified the problem for all memory modules. I also ran Microsoft's Windows Memory Diagnostic program, which didn't report any problems. When I contacted Intel, the company's response was that the memory was too fast (800MHz) and that I should use memory rated at 667MHz or 533MHz, but I am skeptical. Do you know why my system would generate a memory error and what it indicates?

Also, I think my system is running too hot. I have the side off of the case, and I'm using a 160mm comfort fan to blow air on the CPU and memory. The CPU core temperature still registers 45 degrees Celsius and the system temperature is 39 C. If I use the case fans alone, CPU temperature rises to 50 C. I'm using an Arctic Cooling Freezer 7 Pro HSF. It's possible that the thermal connection between the heatsink and the CPU isn't what it should be, but the rest of the system seems warmer than it should be. In particular, the memory modules are very warm to the touch. Is the system too hot? If so, what steps should I take to reduce the temperature?

A: It sounds to us like you're running something out of spec or on the hairy edge of spec for your system memory. What CAS, TRCD, TRP, and TRAS timings are you running the memory settings at in your BIOS? Or do you have the memory timings set to Auto Detect or SPD Detect? Those specific OCZ DDR2 DIMMs, if they're the

model we are thinking of, are rated for DDR2-800 at CL 5-5-5-12 timings. So, if you have timings tweaked any tighter than 4-4-4-12, you're going to either need to bump up the voltage on them or turn down the clock speed. Because the Intel D975XBX board can make some adjustments in this area, you will want to check your settings here first.



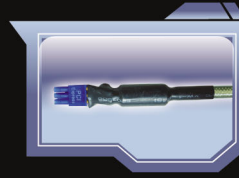
The Arctic Cooling Freezer 7 Pro is a great alternative cooler to a stock Intel HSF combo. These coolers are easily up to the task of keeping an overclocked Core 2 Duo Exxxx series chip cool and comfortable at a modest price of less than \$30.

In fact, your 4GB configuration will make things even more finicky when it comes to timing and voltages. We'd suggest setting timings to Auto Detect in the BIOS and going from there. Also, those OCZ modules need at least 2.1V to run at DDR800 CL 5-5-5-12 speeds, so make sure you have memory voltages set in your BIOS to at least 2.1V, or maybe even 2.2V or 2.3V. After you do that, run Memtest86 again and see if you still get a memory error. We like Memtest86 because it's good at detecting fringe-case timing issues in system memory. Try manually turning down your timing settings if you have to. We doubt that you have defective modules or a timing issue on the motherboard because we've run DDR800 speeds on that version of motherboard many times without issue. In fact, the D975XBX2 (rev. 2) version of that board officially supports DDR2-800 speeds. Also, your system and CPU temps sound perfectly normal to us. We like the Arctic Cooling Freezer 7 HSF a lot—good choice there. Actually, 45 C CPU core temps are pretty tepid in our opinion, and a 39 C system temp is not unusual at all. ▲

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com



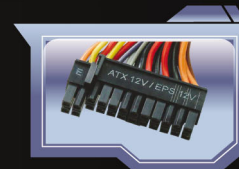
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Switch+12V rail auto combine to
give more power.



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stable current.



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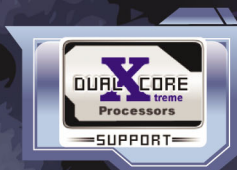


20+4 sliding ATX 12V connec-
tor to work on Intel AMD boards.
EPS 12V support.
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1200W

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6.9"x5.9"x3.35" (LWH)
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Support Dual Core CPU.



Active PFC- 0.99 power
correction factor to save energy.



Tiger Series

High efficiency 80%

The OLPC Laptop

We Take A Look Under The Hood

Regardless of whether you call it the CM1 (Children's Machine 1) laptop, the \$100 laptop, the 2B1 laptop, or the XO laptop (its current name), the hardware behind the OLPC (One Laptop Per Child) project is close to delivery.

Nicholas Negroponte and MIT Media Lab faculty members helped

found the OLPC project, which plans to sell low-priced laptops to schoolchildren around the world. (Read our in-depth interview with Negroponte on page 108 in this issue.) OLPC, a nonprofit organization, will sell the XO laptops to governments in developing nations with the idea that the governments will give the laptops to schoolchildren.

Those involved in the OLPC organization have given the XO several names during the past year, and the laptop's specifications have seen many tweaks and changes, as well. With the XO name finalized and the laptop in beta testing earlier this year, however, it appears the research aspect of the laptop is nearly complete, and schoolchildren will begin receiving their units soon.

OLPC Answers Criticism

Critics exist for nearly every idea, and the OLPC project is no exception. Some critics say underprivileged children need more fundamental things from their governments than computers. Some say the firmware and software OLPC will use in

The XO's System Specs

Display. The XO uses a dual-mode LCD. One mode is in full color for indoor use, and the second mode is a monochrome display for outdoor use in bright sunlight. The 7.5-inch display has a resolution of at least 1,200 x 900 in monochrome and at least 800 x 600 in color. The monochrome mode requires about one-fifth of the power that the color mode requires.

Directional pad. A user can control the cursor in four directions or press enter with this pad.

Hinge. The display can pivot and rotate on the hinge.

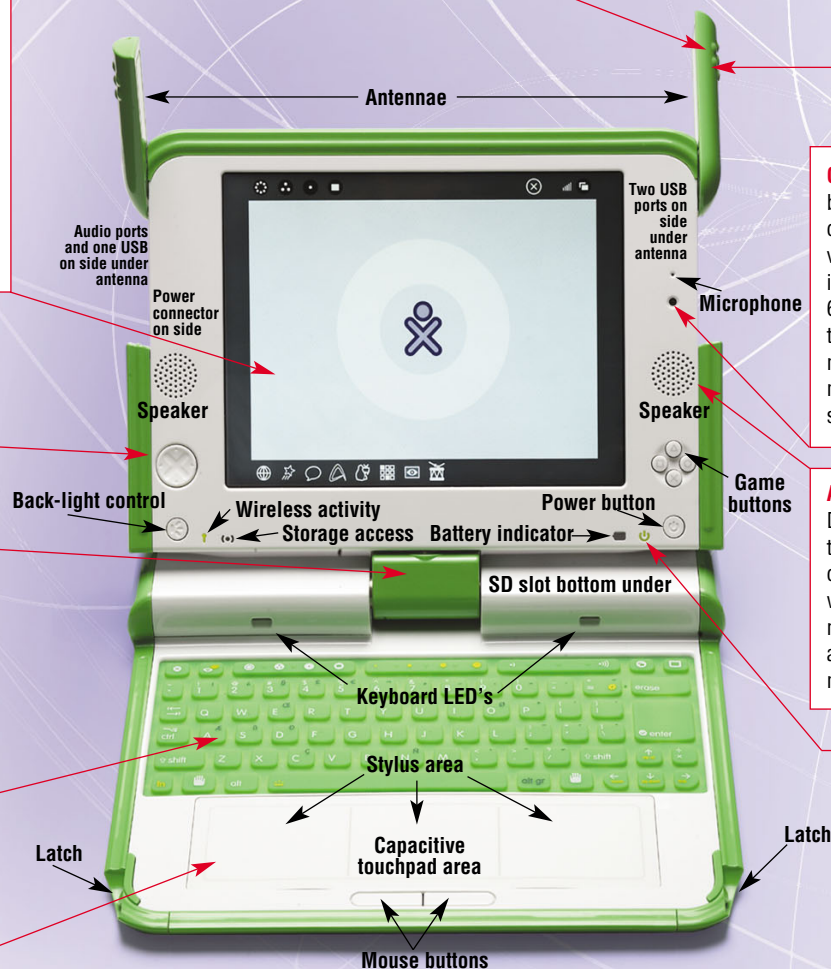
Keyboard. Using a rubber-sealed design, the keyboard is dirt- and water-resistant. Various keyboard layouts are available, depending on the region of the world where students are.

Touchpad. The touchpad/stylus area works as a pointer with the user's finger or as a drawing area with a stylus.

Wireless connectivity. The XO uses Marvell's 88W8388 chip for wireless communications. Because the Marvell chip uses proprietary software, OLPC's selection of this chip has caused controversy among open-source supporters.

Camera. The XO's built-in camera captures both video and still images (at up to a 640 x 480 resolution), and the mesh network makes it easy to share them.

Audio. Analog Devices provides the AD1888 audio codec for the XO with dual internal speakers and a built-in microphone.



the laptops should adhere to open-source standards. Others say the project can't work because the hardware ultimately will be too expensive, the laptops won't last, or the technologies will fail.

Negroponte says the project is an education project, and its ultimate goal is to eliminate poverty through education. He says critics simply are wrong about the project. "OLPC's XO laptop is low-cost, but it isn't 'cheap,'" Negroponte says. "The XO laptop is

intentionally skinny by the standards of today's commercial laptops, and some people therefore criticize it as under-featured. It doesn't rate highly on processor power, but it's by no means a compromised machine. On the contrary, it's leaner and fitter to survive and that goes against our whole business culture."

The original goal of the XO being a \$100 laptop remains in sight, although Negroponte says the first units OLPC sells will cost slightly less than \$150. He says

OLPC should reach the \$100 target for the laptops by the end of 2008. "Our laptop costs less, but not by skimping on quality and sound engineering," Negroponte says. "When you really scale up, then time and money spent on good design—meaning simple design, cutting out the frills, and focusing on the structure—will save a fortune in the longer production and support run." ▲

by Kyle Schurman

Mesh network. XO's double antennae will operate within a mesh network. In the mesh network, each XO laptop essentially will serve as a wireless router, letting other XO users connect to the Internet by "hopping" through a network of XO laptops until they reach the Internet router. Each XO machine will be visible on the mesh network to other XO users, too, letting the children exchange items with other XO users, as shown in the "Mesh Network" diagram below. Solid lines show stronger connections and dotted lines are weaker connections. This mix of connections lets members of the network remain connected even when its strongest connection fails. As soon as the XO laptop has power, the mesh network automatically makes connections.

Power usage. Because many countries where OLPC will sell the XO laptops might not have readily accessible or stable electrical power, engineers needed to make the XO power conscious. The XO will run on 2 to 7 watts of power, as little as 10% of a standard laptop. Also, the XO's design has always included plans for "personal power generation," or a device by which a user could create electrical power to run the XO without a source of electricity. The initial XO design included a hand crank (as shown below left) for the user to generate power. However, using the hand crank put too much stress on the computer. The latest design for generating power includes a pull-cord device from Potenco (shown at lower right). Specific details on the Potenco device aren't yet available. A user can generate power by repeatedly pulling the Potenco device's cord, and the unit will transfer the power to the XO laptop through the connector on the left side of the XO.



Additional Specifications

CPU. AMD Geode GX-500 at 366MHz

Chipset. AMD Geode CS5536 southbridge

DRAM. 128MB DDR266 DRAM

Mass storage. 512MB SLC NAND flash

Battery. 22.8 watt-hours capacity; NiMH cell type

Connectors. Three USB 2.0 ports, SD card slot, 2-pin DC input, 3-pin stereo audio port

XO Dimensions (approximate; subject to change)

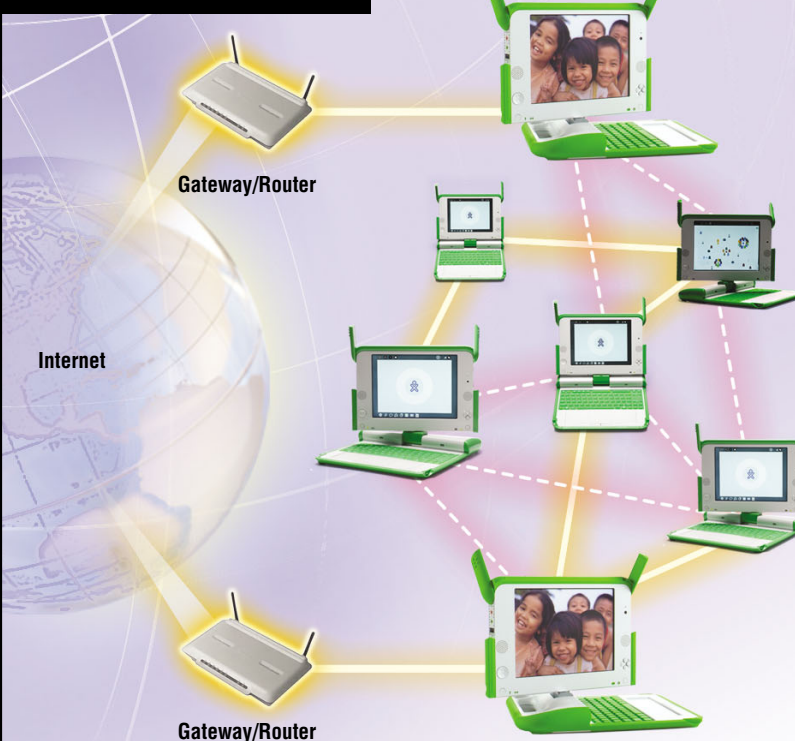
The XO is a small unit designed to fit in the hands of a child.

8.98 x 9.53 x 1.18 inches (HxWxD)

Weight: 3.3 lbs

User interface and software. The XO will almost exclusively use free and open-source software and a version of the Linux operating system. OLPC says using open source will give students and teachers more flexibility while using their systems. The design of the XO's user interface should make it easier for students and teachers to share information and work in a more collaborative manner.

Mesh Network



Fulton Innovation's Intelligent Wireless Power

Cutting The Cords With eCoupled

When it comes to some of the best technological innovations, wireless seems to be at the center of many of them, both today and in the past. Over-the-air radio signals brought events and entertainment into homes as nothing had done previously. Satellite TV delivers signals to rural areas that cable TV cannot reach. Then there's perhaps the greatest wireless device of all—the TV remote control.

With consumer electronics, wireless is very important, as well. For example, cell phones offer significant advantages over traditional landline phones and Wi-Fi coupled with a notebook gives a person the chance to work anywhere at a fast connection speed.

Most portable CE devices still have one wire to deal with, though—the power cord. If you travel with your devices, you may quickly tire of always packing the bird's nest of cables and adapters you need to power all of your devices. And if you forget a cord at home or break an adapter while traveling, the accompanying device becomes completely useless.

A handful of companies, including Fulton Innovation, hope to soon put an end to the tangle of cords that comes with CE devices by delivering power wirelessly. In the near future, you could simply place your CE device in close proximity to a charging area, and the device's battery would fully charge, as quickly and efficiently as if you had

connected it to a wall outlet with a clunky adapter and cord.

Getting Acquainted With eCoupled

Fulton's eCoupled technology had a prominent debut at CES 2007 in January. (For information on what other companies are doing with wireless power, see the "Wireless Power Elsewhere" sidebar.) eCoupled uses inductive coupling to deliver power to devices without wires. Inductive coupling transfers the energy from one circuit component of a device to another via a shared magnetic field. A shared magnetic field is the key to transferring the power, which eliminates the risk of shock, says Dave

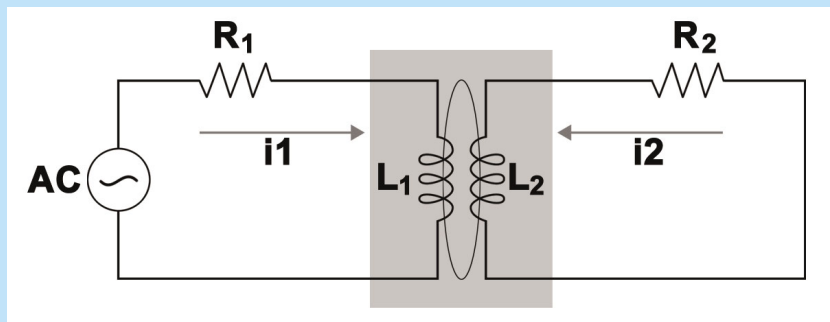
Inductive Coupling At Work

When a user places an eCoupled-enabled device, such as an iPod, near an eCoupled-enabled charger, inductive coupling would allow the transfer of power without the need for a wired connection or even a direct connection of metal conductive plates. This diagram represents the basic process involved in inductive coupling. (Fulton wouldn't discuss detailed specifics regarding eCoupled, including the exact sequence of events and technologies that allow eCoupled to work,

"That's more of the secrets of the technology," Dave Baarman, director of advanced technologies for Fulton Innovation says.)

Inductive coupling involves running a current (R_1) through a coil of wire (L_1), which causes the wire to create a magnetic field (gray box). As a user places a second coil (L_2) within close range of the first coil of wire, the magnetic field causes, or induces, a current in the second coil of wire (R_2). The act of adjusting the rate of current change (i_1) in the first coil causes changes in the current and voltage in the second coil (i_2). (In this example, the oval between the two coils represents the "connection" between the two coils, even though the two coils don't touch.)

Beyond the basic principles of inductive coupling, eCoupled's specifications say that the charger/power pad will only transfer



power to devices when the two coils are within the required range of each other. The technology's specs also say that eCoupled's adaptive inductive power circuit will constantly measure and adjust the frequencies between the coils, which maintains the power transfer at an optimal level, even when other devices are added to or removed from the eCoupled charger. The constant measurements will ensure that the secondary coil can rotate around any axis relative to the primary coil and the power transfer will continue at an optimal level (as long as the coils remain within the required distance from each other).

While transferring power, eCoupled devices won't make noise. The frequencies eCoupled will use are outside audible frequency ranges and won't interfere with other electronic devices. ▲

Sources: Fulton Innovation, National Instruments

Baarman, director of advanced technologies for Fulton Innovation.

Fulton uses a proprietary inductive power supply circuit to make eCoupled work. eCoupled wirelessly transfers power from the power supply circuit's transmitting coil to the receiving coil in a nearby circuit. The receiving coil, sometimes called the secondary coil, works in devices powered by AC or DC. The eCoupled's power circuitry adapts as it seeks resonance at high frequencies, letting it transfer the power in the most efficient manner possible.

Advantages & Disadvantages

Beyond the obvious advantage of making it easier to charge and use handheld and larger electronic devices, eCoupled provides some interesting advantages and a few potential disadvantages.

No more connector ports. As some of us have discovered the hard way, you can severely damage or even destroy a notebook by pulling the cord the wrong way and breaking the connector port. Removing cords and power connector ports from the equation for designing a handheld device would make those devices far more reliable, Baarman says. "Of the companies that we talk to, one of their major reliability issues is cords and cables, so it eliminates that," says Baarman.

Even electrical contacts are subject to damage and oxidization, and eCoupled would be an improvement.

One charger, many devices. With eCoupled, a user could charge several devices on one charging pad, as long as those devices are eCoupled-compatible. It would be a universal wireless charging

technology; Baarman says Fulton hopes eCoupled becomes the Bluetooth of wireless power. "That's the difference between eCoupled and other companies' technologies," Baarman says. "We can transfer anything from watts to kilowatts. Other technologies might be limited to milliwatts or milliamps or have voltage restrictions. We can do 1,000 volts or 3.6 volts. There's lots of flexibility. That lends itself to having one power supply for many devices."

Safer power usage. A user wouldn't have to worry about an overloaded outlet when charging several devices because an eCoupled charging pad would either plug into an outlet or—if it's embedded in a countertop or desktop—connect directly into the user's home's power system. eCoupled would eliminate the danger of frayed adapter cables and the risk of

Initial Uses For eCoupled



Fulton's Baarman says the development of eCoupled from an announced invention to an actual product is following a few key steps. First, companies would have to license the technology from Fulton, letting them build the technology into their products and batteries. Second, Fulton would work with the companies to most efficiently incorporate eCoupled into their products. Finally, the companies would work with Fulton through a development and testing cycle. Fulton demonstrated several eCoupled products at CES in January.

Companies currently working with Fulton on eCoupled products and development include Visteon, Motorola, Herman Miller, and Mobility Electronics. "With many different companies, we're at different levels of development," Baarman says.

Some potential uses for eCoupled are on the left (from top to bottom):

During the manufacturing process, a company could embed an eCoupled charger in a vehicle's dashboard or console. The top photo is an example of an in-vehicle wireless charger Visteon demonstrated at CES 2007.

To give today's handheld devices, such as an iPod, eCoupled capabilities, companies could develop eCoupled-enabled "sleeves," which would slide over the device.

Manufacturers could include eCoupled capabilities in toys, which would end the need for disposable batteries. The manufacturer could completely seal an eCoupled battery inside the toy, making the toy more reliable and safer to use.

An electric car could charge overnight inside a garage without the need for cords. The user could insert a large eCoupled charge pad into the floor of his garage, allowing for automatic charging each time he parked the car in the garage.

Visteon has demonstrated an eCoupled charger (black and green device) that plugs into a vehicle's lighter and fits in a cup holder. A user could then charge eCoupled-enabled devices while driving.

In the future, there could be wireless hotspots in kitchens, where manufacturers of granite countertops would include an eCoupled power pad inside the countertop. The pad would transfer power wirelessly to kitchen appliances when a user placed them on the hotspot. Products' energy needs could vary: A 100W light bulb would work, as would a 1.4KW electric frying pan or blender. The power pad would not "turn on" if a user placed non-electrical devices, such as a cookie sheet, on the hotspot. ▲

Source: Fulton Innovation

shock. And if the eCoupled pad sensed that the power demands from the nearby devices are beyond its capacity, it would then shut down.

No wasted power. Most of today's adapters draw small amounts of power whenever they're plugged in to an outlet. An eCoupled charger would shut down if there aren't any complimentary products within range.

A potential disadvantage. With several companies developing wireless power products, the marketplace might end up with many incompatible technologies, which could make things confusing and frustrating for users.

Making eCoupled A Reality

Inductive coupling of the past was restricted to certain products and limited

applications because of impracticalities. Fulton says it has overcome those problems, and it's already working with several companies to develop eCoupled products. Baarman says he expects companies to follow three methods to help eCoupled work with their products.

Adapter. Companies would create a "sleeve" or compartment that contains the firmware and circuitry the device needs to charge its battery. A user would have to place the device into the sleeve and then place the sleeve in proximity of the eCoupled pad or charger.

Some adapters will include additional capabilities, such as Bluetooth. However, they would probably carry additional costs and could be inconvenient to carry.

Battery. Battery manufacturers could build eCoupled capabilities into their

batteries. Again, this option has its drawbacks because users would have to purchase additional batteries. However, Baarman says adding eCoupled capabilities to a battery wouldn't affect the battery's size or the amount of power it could hold.

Integrated. Eventually, the best way for manufacturers to use eCoupled in their devices would be to build eCoupled support directly into their devices that need power or charging. The devices then could use any battery in conjunction with an eCoupled charging area to obtain power.

Baarman says the first two methods will more likely appear with products in the next few years, as they let users adapt their existing products to work with eCoupled. But those options carry additional costs. As eCoupled grows in popularity, manufacturers would more widely use the third

Wireless Power Elsewhere

Nikola Tesla may have introduced the idea of wireless power in the late 1800s through inductive coupling, but it's only now being perfected.

Fulton Innovation says its eCoupled technology builds on the work of late 19th-century scientists such as Tesla and Michael Faraday to make wireless power a commercially viable reality. Although eCoupled made a significant impression at January's CES with the debut of its technology, Fulton isn't the only company working on inductive coupling and wireless power. And eCoupled isn't the first time Fulton's parent company, Alticor, has used wireless power.

Alticor. Technically, eCoupled received its start with Alticor's eSpring water purification system (www.espring.com). With eSpring, designers placed a UV electrical light in the middle of an eSpring cylinder to purify water by destroying microorganisms. However, having an electrical device inside a cylinder filled with water caused reliability problems with the electrical connector port. Designers needed to seal the light to prevent problems with water penetrating the light's circuitry through the port, but they also needed a way to deliver power to the light. Inductive coupling technology provided the answer. After using inductive coupling for eSpring, Fulton engineers decided to begin work expanding the technology for eCoupled.

Apple. In a mid-February patent application for a wireless docking station for multiple Apple handheld devices, Apple mentioned that the station will use inductive coupling to charge the devices. At the time of this writing, Apple hadn't officially announced any details regarding the docking station, so it's not clear whether another company is providing the technology or whether Apple has developed this wireless charging technology itself.

Edison Electric. Edison is developing a PowerDesk wireless power device that will let a user place devices on a base pad for charging. To use the PowerDesk, devices need a special battery pack

or power receiver. Edison has already announced plans for a series of rechargeable flashlights that will work with PowerDesk.

MobileWise. MobileWise initially announced plans to deliver wireless power to portable devices in 2002, but the company no longer exists. For MobileWise technology to work, manufacturers would have to insert a chip inside a mobile device and a second chip inside the power base. Placing the devices fitted with the chip on the base's surface would charge them. Many of MobileWise's technologies ended up with WildCharge.

Powercast. Powercast has designed its "trickle-charging" technology specifically for small devices such as cell phones. The technology uses RF to transmit low signals over a short distance. Manufacturers would need to construct handheld devices with a Powercast receiving device, which is about the size of a fingernail. The Powercast device would convert these RF signals into power. Trickle-charging would let a user place the RF transmitter almost anywhere. In addition to handheld devices, Powercast says its technology would work very well with wireless keyboards and mice.

Splashpower. This UK-based company initially announced plans for wireless power products in 2002, but Splashpower's products have not yet appeared on the market. Similarly to the other wireless power products using inductive coupling, the Splashpower products would include a charging pad (SplashPad) that plugs into an outlet and handheld mobile devices that include Splashpower capabilities.

WildCharge. WildCharge demonstrated its wireless power products at CES 2007. The company's WildCharger product is a metallic pad that measures only 0.1-inch thick and plugs into an outlet. A user places his device coupled with a WildCharger adapter on the charging pad. Manufacturers also could build WildCharger support into a product. WildCharger delivers up to 90 watts of power, while a second product, the WildCharger-Mini, delivers up to 15 watts. ▲

option, Baarman says. Fulton sees off-the-shelf products integrated with eCoupled representing the long-term solution.

Unfortunately, the first eCoupled products probably won't appear until the second half of 2007, and they likely won't be widely available to the public for at least a couple of years. Until then, you'll have to continue to haul your mess of cords around. ▲

by Kyle Schurman

Inductive Coupling Available Today: Toothbrushes

Today there are some uses of inductive coupling for transmitting power already available, including on some rechargeable electric toothbrushes, such as some Philips Sonicare and Oral-B models. With the toothbrushes, the charger unit plugs into an outlet. The charger contains the primary coil, while the toothbrush contains the battery and the secondary coil. When the user places the toothbrush inside the charger, the two coils become properly aligned. Inductive coupling creates a magnetic field between the two coils and an electrical current passes from the charger to the rechargeable battery in the toothbrush.

However, eCoupled won't be as limited as these products because Fulton has overcome deficiencies in three areas: spatial rigidity, static load, and unacceptable power losses.

Spatial rigidity. The power transmission works at an effective and acceptable level with these toothbrushes because the charger hardware properly aligns the coils; the toothbrush only fits in the charger one way. With eCoupled, however, specific alignments won't be necessary because the product's firmware will measure the resonance between the two coils at varying frequencies to find the optimal frequency for transferring power.

Static load. The charging devices that come with the electrical toothbrushes require a specific amount of power. The charging devices would work inefficiently (or wouldn't work at all) with a different type of rechargeable battery that required more power or, potentially, with a rechargeable battery that has significantly degraded and can't hold a charge. Fulton says its eCoupled devices would be "intelligent," meaning the firmware in the device would be able to determine the type of battery charging, the type of device needing power, and the amount of power the device needs. "The technology allows you to charge whatever battery you have by adapting to that profile," Baarman says. "You have to reliably identify what you are charging. Previous technologies haven't been able to do that. Not only can we recognize what we're powering, but we can deliver different levels of power. We have different charge profiles for different batteries."

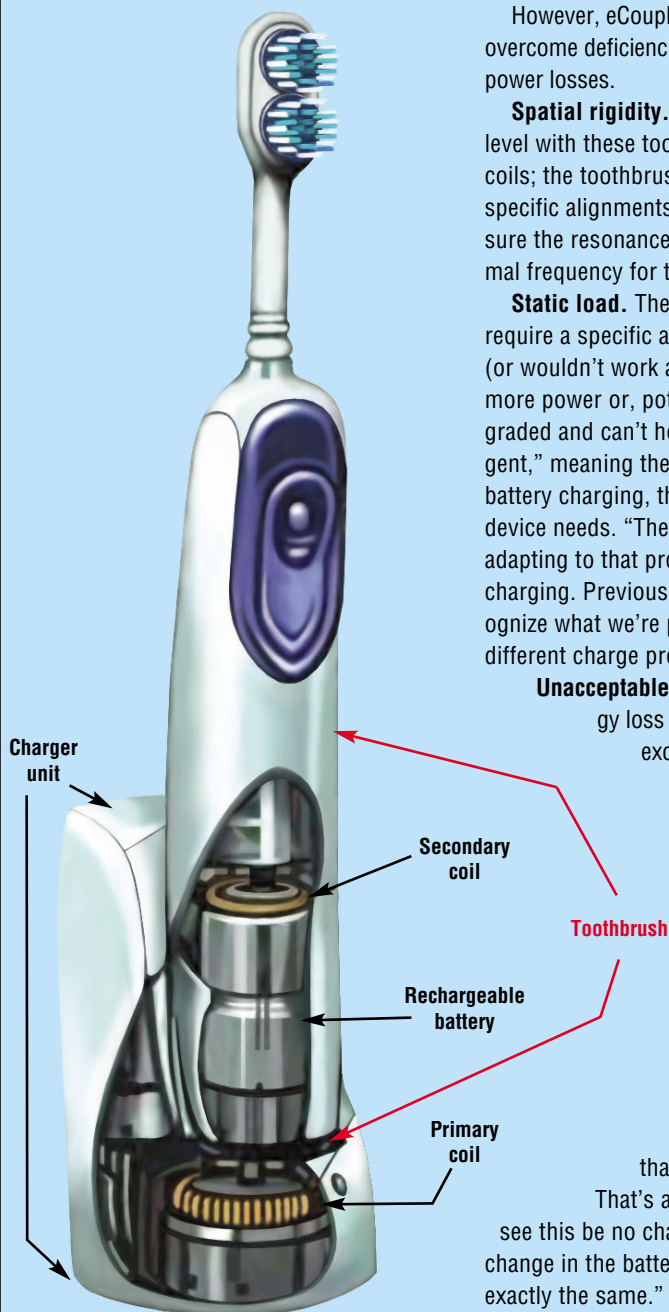
Unacceptable power losses. With most inductive coupling technologies, energy loss almost always occurs between the two coils. That energy loss can exceed 30% compared to directly powering a device with a cord.

"We're not wasting power" with eCoupled technology, Baarman says. "If you place a Hershey's candy bar with a foil wrapper on the charging area, it doesn't attempt to charge. If it's a non-electrical device or not eCoupled-compliant, it doesn't turn on. It's 'intelligent' charging. It charges appropriately and securely each time."

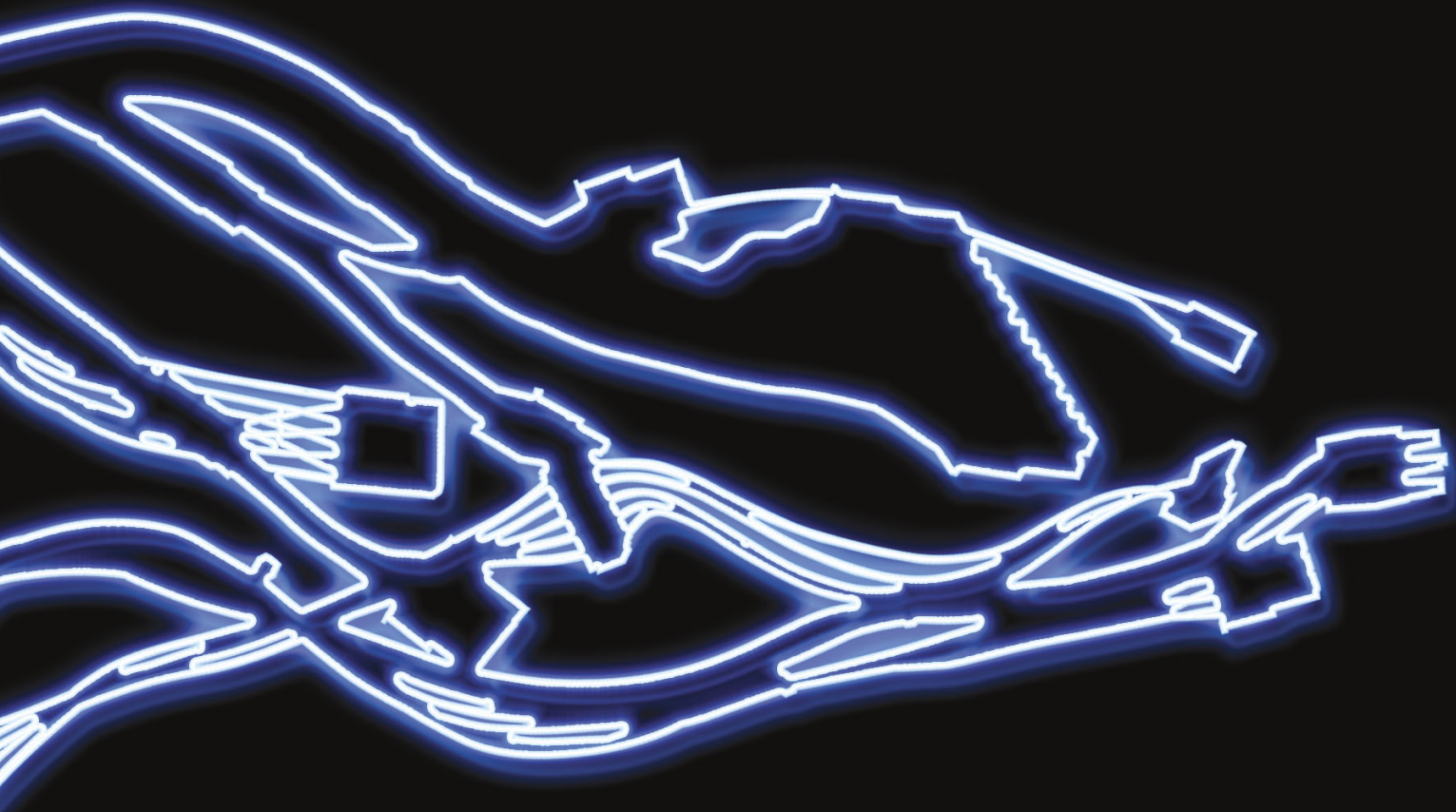
eCoupled's firmware would communicate with each device, determining its power needs before beginning the process of delivering power. And eCoupled's power delivery would be almost identical in time and efficiency to a corded charger; Fulton estimates at least a 98% success rate. "It's a similar time for charging," he says. "We really want

that experience to be where I don't have to sacrifice time or power.

That's a big difference between us and our competitors. We want to see this be no changes [in how devices are charged] for consumers. There's no change in the battery life or power [vs. corded charging]. The charge profiles are exactly the same." ▲



Sources: Fulton Innovation, HowStuffWorks.com



60

THE PRINCIPLES OF POWER

GET YOUR PHD IN PSUs

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HIGH-END PSUs

& THE RIGS THAT LOVE THEM

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BARING THE MIDRANGE

MODERATE PSUs
EMPOWER, NOT IMPOVERISH

Power supplies don't get much love from the average PC DIYer. Think about the first time you built a computer. You spent hours agonizing over your choices for most components, but you probably gave the power supply about as much thought as you did the floppy drive. It's not hard to see why: The power supply plays a support role in your system. Whereas your CPU, memory, motherboard, and even your hard drive affect your system's speed, the PSU simply provides the power those components need.

But you're a power user now. You've assembled plenty of PCs since that first build, and the PSU you bought for your most recent system runs much more quietly, has higher-quality parts, and better expels heat. You've seen low-quality power supplies die suddenly, and you've noticed that other PC components sometimes have shorter life spans when powered by faulty power supplies. You find that you have a real interest in how PSUs work and what makes one better than the other, which means you're at a whole new level of geekiness. Welcome.

Power supply quality is even more important these days than it was only a few years ago, thanks in large part to video cards. Nvidia's SLI and ATI's CrossFire dual-card setups boost power draw significantly, and individual video cards draw much more power nowadays as it is.

CPU recognizes the importance of power supplies, so we take them into account when we review systems from boutique PC builders. Even

SHOEBOX DYNAMOS

SAY HELLO TO ONE OF YOUR PC'S MOST IMPORTANT COMPONENTS

so, a PC review's focus is on the computer's overall quality and performance, so we spend little time on the PC's individual components. Users who want to know more about these PSUs are left wanting more, and to that end we've put together a comprehensive look at power supplies.

Power supplies aren't too exciting from the outside: They're big, bulky boxes that eat up valuable chassis space. PSU cables, while necessary, cause plenty of headaches for system builders who strive to keep systems clutter-free. Some manufacturers spice up power supply aesthetics by adding LED fans and removable cables. Modders often replace metal PSU cases with clear acrylic covers. But in the end, it's truly what's inside the PSU that matters.

To kick things off, we take a close look at the power supply's guts. The quality and size of certain components greatly affects the power supply's overall quality—in fact, you can often spot a low-end PSU simply by checking its weight. Light

PSUs generally have smaller heatsinks and other parts and, as a result, can't handle high-stress, high-temperature situations as well as better-appointed units.

Wattage is a particularly tricky issue, as some manufacturers base the power supply's wattage ratings on inordinately cool ambient test temperatures. In those cases, the ratings don't reflect the wattage capabilities you're likely to see when you pack the PSU into your system's crowded, warm case. We delve into this problem and help you find units that live up to their labels.

Power supply rails are important but oft-overlooked features, so we discuss rails in-depth and explain how to figure out your system's power supply needs. We also interview some of the top dogs at popular manufacturers, including Doug Dodson (PC Power & Cooling), Ryan Peterson (OCZ), and Joerg Theissen (Enermax).

Of course, this section wouldn't be nearly as exciting without some serious PSU roundups. To that end, we put together

two massive matches that pit the most popular PSU brands against each other in two categories: midrange, sub-\$200 power supplies and heavy-duty, high-wattage units that will add some impressive numbers to your system's overall price tag. We put each PSU through some grueling tests and made every attempt to create true-to-life test environments. We discuss the good and the bad about each power supply in detail.

And we have charts. Hoo boy, do we have charts. If you've ever been frustrated by reviews that don't offer information about individual performance, you're in for some good times. You'll find all the information you need about each PSU's rails, connectors, fans, and cable lengths, as well as our test results for power factor, case temperature, and maximum wattage.

If you're geeking out at the thought of 19 PSU reviews, dig in and enjoy. Power supply nirvana awaits on the next page. ▲

by Joshua Gulick

THE PRINCIPLES OF POWER

GET YOUR Ph.D IN PSUs

Designing and building a PC can be a lesson in interdependency. Virtually every major component in a typical system is dependent on another in some way, shape, or form. A processor is basically useless without the right motherboard and socket to mate it with. And neither can do anything without having RAM installed. Even then, the system still needs a video card, input devices, and some form of storage, among other things. But just about all of the major components in a PC do have one thing in common: They all require a stable, constant supply of power to operate.

Ask a group of enthusiasts what they think the most important component in a PC is, and you'll likely hear a multitude of answers. Some will say that the CPU is the heart of a system, while others will say the motherboard is the foundation that ties everything together. But we all know that this is a futile argument at best. At the most basic level, there is no one component that's more important than another, because without all of them working together, there simply is no PC. The fact remains that every major component needs power—sometimes a lot of power (as is the case with today's multicore processors and high-end graphics cards).

The increasing need for power in a PC has spurred a myriad of companies to expand their product offerings to include enthusiast-class power supplies, and the established players who have been specializing in PC power for years have also bolstered their PSU lineups. Companies such as Corsair and OCZ fairly recently have begun selling their own branded PSUs, while longtime players such as PC Power & Cooling and Enermax have augmented their inventories with 1kW+ units to meet the market's need for ever more powerful PSUs.

As the demand for higher-capacity power supplies rapidly increased these past few years, the influx of new

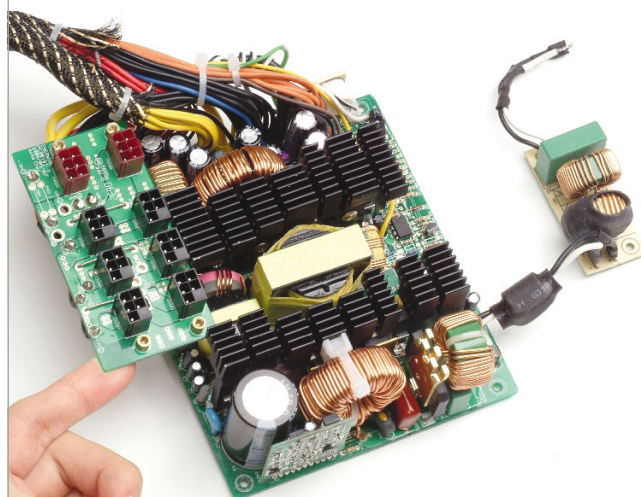


The modular connectors on an Enermax power supply let you connect only the cables you need.

PSUs that complied with newer standards have coexisted alongside older PSUs and caused some confusion in the marketplace. Even some of the more savvy power users were thrown off by the new connectors, features, and form factors that arrived with some of the latest PSUs. Questions have steadily poured in to us here at *CPU* on the topic, so we thought we'd visit the subject to answer your questions.

We've also enlisted the help of some industry insiders to get their take on a number of issues related to power supplies and the power supply industry in general. PC Power & Cooling's President and founder Doug Dodson, Enermax's Global Chief of Marketing Joerg Theissen, and

Large heatsinks, capacitors, and coils are visible in this shot of the internal core components of an Enermax Infiniti PSU.



Ryan Petersen, CEO of OCZ Technology all chimed in to give us their perspectives on the industry.

The Basic Design

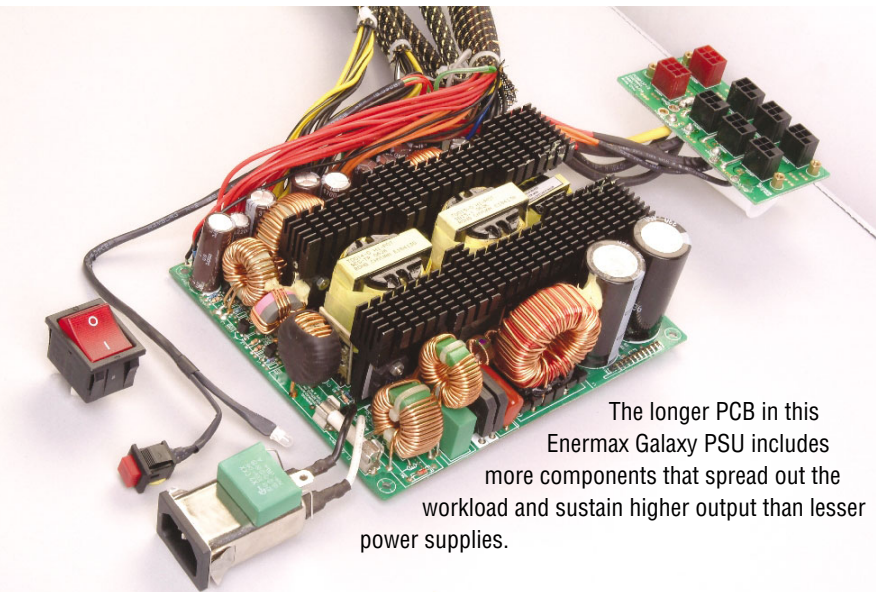
All current PC power supplies share a number of common traits. They take the AC from a wall outlet, step it down, and convert it to DC, which feeds the many components in a PC. Here in the United States, a PSU receives 120VAC (volts alternating current) from the outlet, converts it to DC, and distributes it among 3.3V, 5V, and 12V rails that each feed different system components. In Europe and many other countries, the AC input voltage is 240V, but the power supply will automatically step that down to the same 3.3V, 5V, and 12V DC voltages.

The dimensions of a typical ATX12V power supply, the type of PSU used in virtually all current desktop computer systems, are 150 x 86 x 146 millimeters (HxWxD). Some higher-capacity models, however, are a bit deeper; the extra space is needed to accommodate some additional components. The larger enclosures used on some of these higher-capacity power supplies are 150 x 86 x 230 millimeters. The internal components in a power supply typically generate a fair amount of heat, so most PSUs are actively cooled with one or more fans (sizes vary). There are some passively cooled PSUs that rely on oversized heatsinks that usually protrude out of the back of the PSU; these PSUs are relatively low-capacity.

What's In A Cable?

A relatively new feature to PC power supplies that arrived with some trepidation is modular cable connections. Essentially since the inception of consumer PSUs, the large bundles of wire and cable connected to the core PCB within a PSU were soldered securely in place. You couldn't alter the main power connectors or the peripheral accessory connectors without using adapters to add additional connectors or actually cutting wires to remove unused ones.

But this really wasn't an issue for the vast majority of users. It was fairly easy to



The longer PCB in this Enermax Galaxy PSU includes more components that spread out the workload and sustain higher output than lesser power supplies.

neatly tie up and conceal unused cables and connectors within a system fairly easily. Recently, however, windowed cases and case modding have become more widespread. And with the proliferation of systems that have their internals on display for all to see, the desire to clean up the wiring inside the PC also increased. Rounded data cables became more popular, and PSU manufacturers began to sleeve their PSUs' wiring with monotone protective sheathing. Even PSU enclosures were updated with more attractive high-gloss finishes.

Then modular cables arrived. With modular cables, enthusiasts could connect

only the cables they needed, which eliminated any unused quantity of wires within the system. Modular PSU cables went a long way toward improving the aesthetic appeal of the inside of a PC and offered the added benefit of having less cable clutter to restrict airflow.

The concern over modular PSU cables is that breaking a connection that was previously hardwired and replacing it with a nonpermanent plug/connector could cause voltage fluctuations and increase the resistance of the cable run. Addressing this issue, Dodson says, "Modular plugs are a feature found only in consumer (noncommercial) power



OCZ took a unique dual-PCB approach with its ProXStream 1000W PSU. Using two smaller PCBs stacked on top of each other to build its core let OCZ squeeze its ProXStream 1000W into the standard compact ATX form factor.

Power Factor Correction: What Is It? Do I Need It?

PFC is another sought-after power supply feature. PFC comes in two forms, active and passive. As its name implies, PFC compensates for power factor, which is the ratio between real power and apparent power in a circuit. Without being too technical, think of AC voltage and current both being delivered from the outlet as simple sine waves. Different types of loads placed on the line can cause the voltage and current waves to go out of phase. With fully resistive loads (heating elements, etc.), voltage and current typically remain in phase. But with inductive or capacitive loads (fans, electric motors, and most complex electronic devices), energy that is stored in the load can cause voltage and current to go out of phase. This means that the current may lead or lag behind the voltage at a given time.

When voltage and current are perfectly in phase, the power factor is 1 (good). When current leads or lags voltage by 90 degrees (which is the worst-case scenario), the power factor is 0 (bad). A power factor close to 1 is more efficient in the long run because it requires less current. It can also lead to a more stable system.

Active PFC is preferred over passive PFC because it can usually provide an adjusted power factor closer to 1. Because active PFC uses a dedicated circuit to correct power factor, it's able to offer theoretical power factors approaching 1. Active PFC works by switching in and out banks of capacitors and inductors to counteract the capacitive or inductive effects of the load. It also reduces electrical noise and can adjust to a wide range of input voltages. Lastly, it automatically corrects for AC input voltage, which is why you don't see the 115V/230V switches of old on the back of power supplies outfitted with active PFC.

Practically speaking, a PSU with active PFC is better equipped to cope with voltage spikes and noisy home electrical lines, which can enhance the stability and longevity of a system. Active PFC will also make a power supply more efficient, even though a PSU's efficiency rating doesn't include it. But because active PFC is the more complex of the two methods to implement, it is more expensive to produce power supplies with active PFC.

Instead of utilizing a dedicated, specialized

circuit, passive PFC uses a relatively simple method of capacitive filtration on the AC input to correct for poor power factor. Unlike active PFC, passive PFC requires you to manually select the AC input voltage. And because it is less efficient than active PFC, passive PFC doesn't provide the full power potential of the AC input.

Most of today's PC power supplies offer some form of PFC, not only because it improves overall efficiency, but also it is a legal requirement in some areas, Europe in particular.

"Active PFC is desirable to consumers, especially in regions with less-stable wall current," Petersen says. He added that active PFC reduces operating costs over an extended period of time, improves voltage stability, and benefits the environment.

Dodson agreed, saying, "Active PFC eliminates the need for manually switching the voltage range (the old 115V/230V switch), improves the PSU's ability to handle line sags and surges, reduces line noise, and lowers the peak current needed from the utility line. Active PFC should be a feature in any modern PSU." ▲

can easily loosen, corrode, or burn, causing a major system failure."

Although some manufacturers may use pins rated for more than 5 amps of current, there's no denying Dodson's comments: It takes more current to flow from one contact to another than it would through a solid cable.

Petersen doesn't necessarily agree. "Both have their place in the market," he says. "Modular PSUs are excellent for many consumers because they are easy to configure and . . . you only use the cables you need."

"[You] help promote better airflow in your systems. Enthusiasts looking for the ultimate core and efficiency may prefer a nonmodular PSU, which, in terms of performance, is still the best."

Theissen also believes modular PSU cables have their place in the market. "Modular PSUs do have a [performance] loss compared to native PSUs," he says, "but the fairy tale of significance or danger is exaggerated. It can hardly be measured."

Ridin' The Rails

Another debate raging in the PSU industry concerns modern multirail PSU designs compared to high-capacity single-rail models. (A PSU rail is a circuit designed to provide a single voltage.) As the power needs of processors and graphics cards have increased, some PSU manufacturers incorporated multiple 12V rails into their designs. Typically, one or more rails feed the PCI Express power cables necessary for high-end graphics cards and peripherals, while another is dedicated to the CPU. The idea of dual 12V rails first appeared in Intel's ATX12V 2.0 design guide.

On the surface, multiple 12V rails seem like a good idea because each power-hungry component can have its own dedicated power feed. But there are issues with having multiple 12V rails. The issues stem from a 240VA (volt-amps) limitation set forth by the UL (Underwriters Laboratories) level 3 guidelines for multirail PSUs. A 240VA limit means 20 amps is the maximum current a compliant PSU can feed on a 12V rail ($240\text{VA} / 12\text{V} = 20\text{A}$).

supplies. They allow PSU manufacturers to stock fewer models because the output harness configuration is flexible. Consumers like the convenience but are generally unaware of the impact on performance and reliability."

"Modular plugs cause voltage drop because they add as much resistance as 2 feet of wire, and they limit overall power delivery because the pins used are rated for no more than 5 amps of current," Dodson adds. "Worse yet, the pins are delicate and

Let's compare two hypothetical PSU designs. PSU A has three 12V rails, each rated for a maximum of 20A. PSU B, on the other hand, has a single 12V rail that can supply 60A all on its own. The multiple rails of PSU A are distributed among the CPU, graphics card, and peripheral connectors. Let's say the CPU connected to PSU A only consumes 8A, and the peripherals connected consume another 10A. That leaves 12A and 10A still available on their respective rails. But what happens if the graphics card (or cards) connected to PSU A requires 24A? The rail dedicated to graphics can supply only 20A and cannot tap the unused capacity from the other underused rails. This could lead to overcurrent shutdown or damage the PSU, even though the total power consumption of the components doesn't exceed the PSU's total capacity. With a high-capacity single-rail design, this is not an issue because a single rail distributes the entire load.

Our industry insiders had mixed feelings about using multiple PSU rails. PC Power & Cooling, which only sells

MODEL : PURE POWER-680APD							
AC INPUT: 115V-230V FREQUENCY : 47 - 63 Hz							
DC				OUTPUT			
+5V	+3.3V	+12V ₁	+12V ₂	+12V ₃	-5V	-12V	+5VSB
50A	28A	15A	15A	8A	1A	1A	2A
C _{UL} ® E144195 LEVEL 3		SAFARI CERTIFIED TYPE APPROVED		FCC Tested To Comply With FCC Standards FOR HOME OR OFFICE USE		CE CB	

The specifications label on most power supplies will detail the maximum current output of its individual power rails.

high-capacity single-rail power supplies, holds the position that a single rail will be able to supply the PSU's full capacity to the entire system, as opposed to spreading the capacity across multiple rails and potentially isolating some of the capacity.

Theissen explained that a multi-rail PSU's greater power stability and

reduced risks involved with a PSU failure offset its limitations. "On any PSU, the more devices connected to [the same] 12V rail, the more the rail will flutter," he says. "[The peripherals'] ups and downs in consumption cause this effect. Generally, when a PSU dies due to component failure, a certain current rush occurs. If [the failure is] on the primary side, nothing will happen. But if [it's] on the secondary side, a current rush will strike the system. Depending on the duration and level of this current rush, components might be damaged, potentially frying the system. When comparing single-rail vs. multirail, this frying aspect becomes obvious."

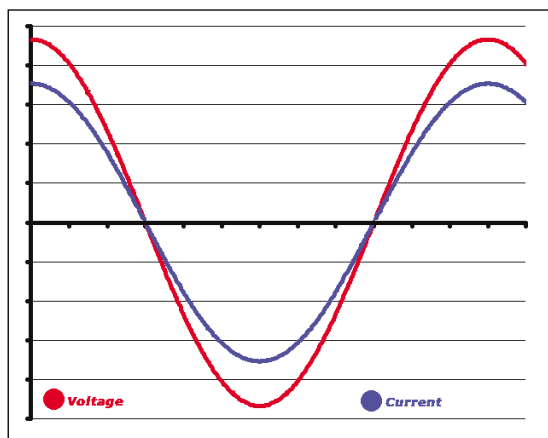
Put another way, a high-capacity single-rail design has the potential to send a much larger surge through a system in the event of a failure. Petersen hints at the same thing, saying, "If the load is distributed over multiple rails, it reduces rail cross-talk across rails that supply different components. In addition, multiple rails help to eliminate various issues that are the result of high currents on single rails."

Avoid An Efficiency Deficiency

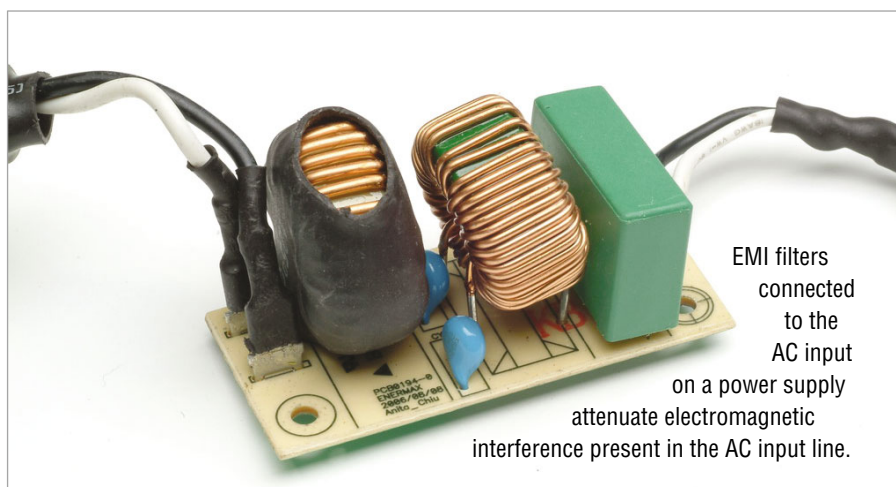
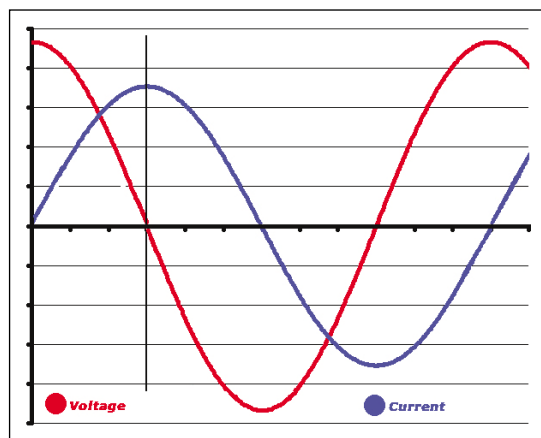
Efficiency is another subject of PC power supplies that has caused confusion. Most quality power supplies shipping today should be roughly 80% efficient. This means approximately 80% of the



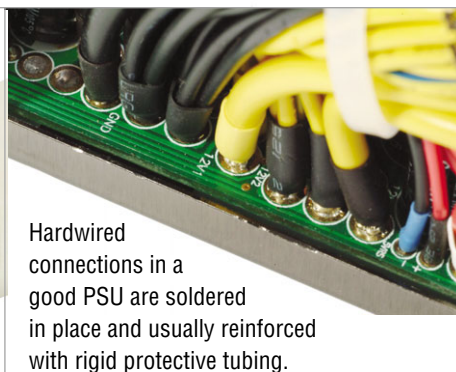
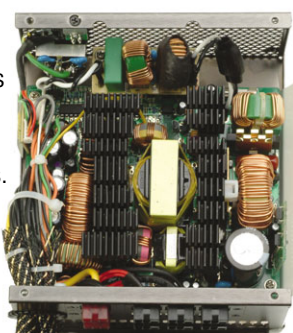
Next-generation PCI Express 2.0 graphics cards require an 8-pin (or 6+2-pin) power connector like the one pictured here.



When the voltage and current are perfectly in phase, the power factor is 1. When they're 90 degrees out of phase, the power factor is 0.



High-quality PSUs tend to be packed with components.



power drawn from the electrical outlet is retained by the PSU and channeled to the individual rails within the PC. For example, if an 80% efficient PSU is supplying 500W, it's actually drawing 625W from the outlet. The missing 20% is usually lost as radiated heat.

The fact that a power supply's components generate heat means we will never see a 100% efficient PSU. In fact, good power supplies have only recently hit the

80% efficiency mark. Dodson adds that today's power supplies should be at least 80% efficient. In addition to running cooler and quieter, an 80% efficient PSU can reduce your electric bill, provided its efficiency rating is believable.

Historically, many manufacturers' PSUs' real-world efficiency has been far below the published rating. The operating temperature range or testing conditions used to produce these ratings would never

exist in a typical PC. As a result, these so-called high-capacity power supplies would fail even under moderate loads.

Our advice: When purchasing a PSU, select one from a well-known manufacturer with an established track record of quality. You simply cannot compare the power supplies from recognized, established companies to those no-name, generic units that flood the market. Dishonest power supply ratings are so rampant, it's practically common knowledge.

"The PSU industry is one of the most cheating ones, with very weak regulatory supervision," Theissen says. "This is the main reason for the confusion among end users on which PSU they really need."

Like purchasing just about every component in a PC, use common sense. A 500W PSU included with a \$29 case is not going to be of the same quality as a standalone unit from a reputable manufacturer. Additionally, a lightweight, no-name unit will likely be vastly inferior to a solidly built, heavy-duty, name-brand PSU. In regard to power supplies, the old saying, "You get what you pay for" usually applies.

What Else Should You Think About?

Although total power, rail configuration, and efficiency are all important considerations, there are a number of other things to look out for when shopping for a PSU. As the ATX12V standard has evolved over time to accommodate market needs, so have the number and types of connectors on a PSU. The latest

Need More Power?

So how do you know which power supply to use in your next build? There are no hard-and-fast rules that'll make the decision simple, but with a little research, it's not terribly difficult to figure out how much power you'll realistically need. First, forget about total wattage. Yes, a high-wattage PSU from a reputable manufacturer will probably do the trick for the majority of builds, but figuring out your actual current requirements is the right way to go. And to do that, you'll need to compile the following information: the total current draw of the components that'll be used in the system and the distribution of power across the power supply's 3.3V, 5V, and 12V rails.

Ascertaining your components' total current requirements will determine your peak wattage requirements. This will give you a wattage guideline. If you figure out that your peak requirements hover around 500W, then shop for a 500W or larger PSU. Knowing the current requirements of your individual components will also tell you if the potential loads placed on the individual rails will exceed the power supply's capabilities.

To figure out the current requirements of the individual components, you'll need to review each component's specifications. Intel and AMD publish white papers with detailed specifications for their processors, so that's a good place to start. Nvidia and AMD also disclose the power requirements of their graphics cards. For hard drives, optical drives, and other components, such as cooling fans and keyboards, check the product's users manual or look for a label affixed to the product itself to find information on current draw and voltage requirement. A power supply usually has a label that clearly lists the peak current output of each of its individual rails.

To help you determine what kind of power supply you'll need for your next build, we've put together a chart with the approximate power requirements for a fairly powerful desktop system equipped with a dual-core processor and single high-end graphics card. There are a number of things to keep in mind when looking at our example, however. We used approximate power requirements of a motherboard with an integrated audio codec and network controller. Simpler motherboards may require less power; a motherboard with numerous integrated controllers and extra features may require more. Also, the voltage requirement for DDR2 RAM varies between 1.8 and 2.4V. The higher the memory's voltage is, the more current it will consume. The power requirements of hard drives and optical drives manufactured by different OEMs can also vary significantly. The hard drive in our example was a Hitachi Deskstar T7K500. Different capacities, spindle speeds, cache sizes, and interfaces will require different currents.

For this example system, we'd need a PSU capable of supplying 8A on the 3.3V rail, 11.6A on the 5V rail, and 30.1A on the 12V rail(s). By

using a formula for calculating wattage (volts x amps = watts), we can also determine that our peak wattage requirement is 445.6W, which is the sum of the rails' requirements.

Please note that this is a worst-case scenario; it's very rare for every component in a system to be under a 100% load at the same time, and we've erred on the side of caution with our estimates. In fact, we recorded the power consumption at the outlet of a machine with specs similar to our example, and it never exceeded 310W. On the other hand, you should also factor in some headroom to account for overly optimistic ratings by some PSU manufacturers and to allow some extra capacity for future expansion. Giving yourself a 30% buffer should do. With that in mind, our adjusted peak wattage requirement is 578 watts. Finally, we compared the specifications of different power supplies in the 600W range to end up with the "right" power supply.

"Always check out the latest reviews and see what third-party experts have to say about PSU designs, performance, and efficiency," says Petersen. "Unfortunately, some manufacturers advertise unrealistic peak wattages and efficiency ratings."

We prefer to let the cores speak for themselves in the hands of independent media. It is also important to match the PSU of their choice with their unique requirements."

Dodson adds, "End users should know that wattage claims are exaggerated by many PSU manufacturers and marketers. They should also know that 'supports SLI' and 'supports CrossFire' does not mean anything."

End users should go to Nvidia's and [AMD's] Web sites to check which power supplies are actually certified . . . for which graphics cards." ▲

Current Usage In Amps

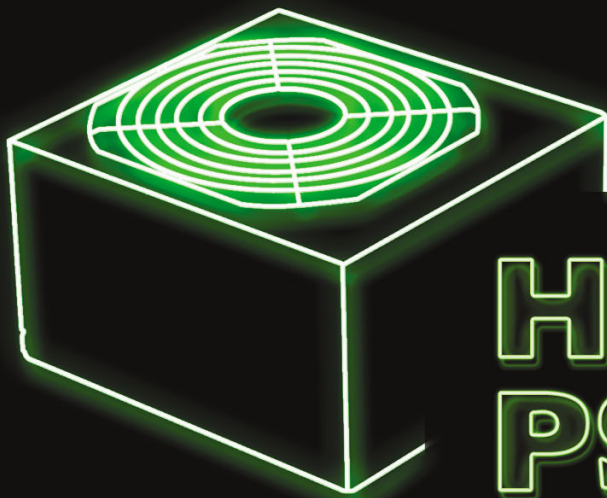
	3.3V	5V	12V
Athlon 64 X2 6000+	0	0	10.4
Motherboard	8	5	1
RAM (2x 1GB DDR2)	0	4	0
GeForce 8800 GTX	0	0	15.4
Hard Drive	0	0.7	0.9
DVD RW Drive	0	0.9	1.4
Keyboard	0	0.25	0
Mouse	0	0.25	0
4 Cooling Fans (.25A each)	0	0	1
USB Devices	0	0.5	0

change will be the addition of an 8-pin (or 6+2-pin) power connector for next-gen PCI-E 2.0-compliant graphics cards. When buying a power supply, be sure to read the PSU's specifications and check

that it meets your needs. How many 4-pin peripheral and 6-pin PCI-E connectors do you need? And what about SATA power connectors? In addition to knowing your actual power needs, make sure

you've answered these questions before making a purchase. ▲

by Marco Chiappetta



HIGH-END PSUs

& THE RIGS THAT LOVE THEM

Numbers don't lie. Or do they? The advertised wattage rating is the one figure that every computer user looks at when choosing a new power supply. The problem is, it's a figure you can't really trust. I found a PSU advertised as an 1,100W blockbuster, but it couldn't run a cutting-edge PC without randomly rebooting. At the same time, some so-called 610W and 620W units powered the same system without any problems (see the following article for write-ups on those).

Unfortunately, few manufacturers market their power supplies the same way. Some sell PSUs by the continuous wattage ratings the units can pull 24/7; others, by their peak power draws that shouldn't be sustained for more than a minute. Some vendors arrive at their ratings at testing temperatures of 35 degrees Celsius (95 degrees Fahrenheit) or even 25 C (77 F)—unrealistically low figures for a high-end computer's case temperature—while others rate their PSUs at 40 C (104 F) or a more grueling 50 C (122 F). It does make a difference: A PSU that can handle 1,000W at 25 C may only be good for 850W at 50 C.

Still others, like the 1.1kW unit I mentioned above, are simply overprotective, shutting down whenever anything electrical goes slightly astray. It's admirable that protection of your computer components is foremost in some manufacturers' minds, but what about the disk errors from unexpected shutdowns? Fortunately, most PSUs strike a balance between stability and protection.

All of these considerations are becoming crucial now that power requirements have become crazy-bad in top rigs. Dual-core processors gave way to four cores. Two-drive RAID 0s are nervous about

three- and four-drive RAID 5 and 6 on PCI Express. And Quad SLI GeForce 7950 GX2s may soon be bumped by Quad CrossFire R600s, plus physics cards.

When you're shopping for an expensive power supply to run that ultimate PC you've built, you don't want to be short-changed. Here's my take on a large group of hopefuls from 700 continuous watts on up.

How I Tested

Confusion reigns in PSU marketing, so I set out to clear the air with some harsh, real-world tests. I mounted and ran each unit in a closed case—not on an open-air bench—under stressful operating conditions.

I used a test system with the following configurations:

A: 2x FX-74, 2x 8800 GTX SLI (8XAA/16XAF)

B: 2x FX-74, 1x 8800 GTX (8XAA/16XAF)

C: 2x FX-74, 1x 8800 GTS 640MB (2XAA/8XAF)

D: 2x FX-74, 1x 7900 GTX (2XAA/8XAF)

All configurations featured the following: 3GHz processor speed, 4x 1GB Corsair CM2X1024-8500C5D Dominator DDR2, two Raptor 10,000rpm hard drives, one WD 7,200rpm drive, two Sony DVD drives, one floppy drive, Asus' L1N64-SLI WS (nForce 570 SLI) mainboard, ForceWare 97.92 drivers, and a Dell 3007WFP display at 2,560 x 1,600.

Systems C and D didn't have enough video RAM to run 8XAA/16XAF at 2,560 x 1,600, but 2XAA/8XAF worked. I used Windows XP SP2—fully patched—as I didn't want any instability attributed to incompatibilities between my software and Windows Vista. PC Wizard 2006 reported the system temperatures.

Not every power supply could handle a top-end system, so I varied the graphics card configuration to get a rough idea of each unit's capabilities. Torture-testing a

PSU via this method is basically like using a go/no-go gauge. You want a power supply that will easily handle your current system build and, ideally, your next one, too. But it will either work stably under a heavy, continually changing load, or it won't. If a PSU didn't have enough 6-pin PCI-E connectors, I used adapters from one of the video cards' retail bundles.

I continuously looped 3DMark06 1.1.0 as individual instances of Prime95 ran on all four CPU cores using the In-Place Large FFTs Torture Test. The idea was to maximize the test PC's power draw by utilizing as much of the CPU and GPU(s) as possible, with the RAM, hard drives, and motherboard core logic getting a workout along the way. 3DMark also provided variation in load to better test transient response. I noted the beefiest configuration each PSU could reliably run between two to four hours (I'd like to have tested each unit for several days) in the "Tested Stable To" row of the accompanying chart.

In configuration A, this truly hungry system sucked a maximum of 865W under load depending on the power supply, according to my Extech 380803 power analyzer. You know, your basic PSU's nightmare.

I hadn't planned for my computer case to add to the PSUs' (and my own) torture, but it did. Thermaltake's Armor Extreme doesn't let you pull a power supply out the back like any sensible case; you have to move it through the front drive bays. Even more egregiously, Thermaltake decided to turn

the PSU on its side and put a hard drive cage next to it. This not only places the weightiest components in the upper rear of the case (although it does allow the hard drives' fan to evacuate heat) but also makes fan-side power harnesses several inches shorter. Most damningly, it causes the hard drive cage to block any bottom-mounted PSU fan that would normally face the CPU(s). On the bright side, this setup allowed me to test affected PSUs under horrible ventilation conditions.

One thing I dropped from my testing was direct measurement of the voltage level ranges. Like the Nvidia 680i Evga motherboard I've used earlier, my Asus nForce 570 SLI board didn't report its +12V and +5V voltage levels. Also, my inexpensive digital multimeter exhibited voltage variation even at baseline, so I'd have to call my hands-on measurements inconclusive. In the end, I reasoned that any components running too far out of spec would make themselves known through instabilities. I certainly didn't want anyone to base a buying decision on such questionable data.

Cooler Master Real Power Pro 1000W

In case you're wondering why on earth you'd ever need a kilowatt power supply, look to setups such as AMD's 4x4 (two dual-core processors and two behemoth graphics cards). And dual 8800 GTX cards consume huge quantities of power even with "only" two GPUs. By all accounts, AMD's R600 is going to have even beastlier power requirements, especially in CrossFire.

At nearly \$200 cheaper than the PC Power & Cooling 1KW SR, but seemingly giving up little more than a couple years on the warranty, the Real Power Pro 1000W looks like a winner. It has the right power connections for either CrossFire R600s or SLI 8800 GTXs right out of the box—no adapters needed.

Also, there may be something to the >85% efficiency rating, although Cooler Master didn't specify the wattage level at which this figure holds true. In repeated tests, the Real Power Pro drew fewer watts from the wall plug (766W) than any other unit while running system A.

With black mesh sleeves, subtle good looks, and a colossal fan, model RS-A00-EMBA is clearly aimed at power users with taste. (And hey, it comes with a branded bottle opener.) This nonmodular PSU's only apparent downside is that you'll have a lot of cables to tie up and stow.

Enermax Infiniti 720W

The Infiniti 720W's CoolGuard feature keeps the PC's fans running for up to a couple of minutes after the computer shuts down. I'm skeptical of Enermax's claim that this prolongs PC components' life by up to 20%, but I've never seen proof either way, to be honest.

Like the Corsair and some others, the Infiniti uses 105 C capacitors. It ran my top system at a maximum of 810W for more than three hours. That's only 10W past its rated peak, but 18 C above the wattage peak's temperature rating. The Enermax's rear grille grew



Real Power Pro 1000W

\$319.99

Cooler Master

www.coolermaster.com



Infiniti 720W

\$229

Enermax

www.enermaxusa.com



Galaxy DXX 1000W

\$369

Enermax

www.enermaxusa.com



XScale 750W

\$279

E-Power

www.epowertec.com



too hot to touch, but this might have been because of the hard drive cage blocking the Infiniti's big 135mm bottom fan. With normal ventilation, this PSU might have indeed earned the name Infiniti . . . or at least Indefiniti.

Enermax Galaxy DXX 1000W

The DXX version of this popular kilowatt unit indicates 8-pin PCI-E support through 6+2 connectors. There are a total of five 6-pin PCI-E connectors, or three 6-pins and two 8-pins as needed. If, as rumor has it, AMD supplements its 8- and 6-pin R600 with a 6-pin physics card, this PSU would have enough native connections for an R600 CrossFire + physics setup.

And talk about future-proofing: There's even power on tap for mega systems with 32 to 64GB of RAM, Enermax says. Three transformers lie inside, and an LED/buzzer combination relays error codes to the user. And it has enough optional SATA and Molex connectors to choke a horse, although I did not have time to test this.

Most modular units have at least a few integrated cables, but model EGX1000EWL really qualifies as being semi-modular. Its integral harness has more connectors than most midrange, nonmodular units. If your goal is a modular PSU with as few cables as possible, this isn't your unit. But if you want to run next year's PC, and the year's after that, take a gander.

E-Power XScale 750W

Sliding in well after deadline was a pair of ePower PSUs made by Topower.

There are four EMI-shielded PCI-E cables (two in 6+2 trim), but they were barely long enough to reach the bottom 8800 GTX in SLI in my infernal Thermaltake case. SLI certification for GeForce 7800s is pending, E-Power says.

You can toggle between one or four rails with a switch. There's also a fan speed button on the rear of the PSU, but I'd prefer thermally automated fan speed any day. I tested the XScale with a single rail and at top fan rpm.

Running system A, the XScale drew 55 more watts than the next closest PSU. Read that again: 55 more watts, meaning, "Hello, electricity bill." It stank to high heaven but didn't die, just like the Tagan 480W in the next article. This unit resembled the Tagan in a number of other ways, such as the cable shielding and grille badge, owing to a common heritage.

E-Power Tiger 1200W

This high-wattage, modular PSU has attractively sleeved, copper-shielded cables. It uses XLR-type connectors similar to a professional microphone's, although the Tiger's connectors use threaded collars rather than spring clips to lock them in place.

Unfortunately, some of the cables are so stiff that their connectors, especially SATA ones, occasionally popped out. The SATA and Molex connectors were unnecessarily big, too, sometimes making them difficult to hook up.

The unit's six rails feature automatic power sharing. An LED on the rear panel lights up when rail combination takes place. However, its power factor dropped

significantly over a few hours to 0.94, which concerned me. In any case, 8800 GTX SLI and R600 CrossFire certifications are pending.

FSP FX760E

The FX760E started off on the wrong foot with me, but I'm still innocent of its murder. I don't like PSUs marketed by their peak wattage ratings, especially when those were established at a room-temperature 25 C. But the glove doesn't fit; you must acquit.

Like certain breeds of dogs, my sample unit of the FX760E didn't know when to give up. It's up to the master to realize when a poor, overworked dog needs a rest, lest it drop dead of exhaustion. Erm, whoops.

Ordinarily, when a PSU can't handle the demands imposed on it, it will shut itself off instead of blowing an O-ring, so to speak. The FX760E does have OCP (overcurrent protection), OVP (overvoltage protection), and short circuit protection, according to its documentation. But it gave its all trying to please configuration A. The smell from its back grille confirmed that this valiant FSP had, indeed, shuffled off this mortal copper coil.

Ah, well, such is the nature of torture testing. This is the first FSP unit I've ever killed, and all have been utterly stable to the point of being boring. Still, its metallic blue shell made for a very pretty carcass.

FSP Kingcraft 1000

The "1000" of the new Kingcraft 1000's name is a little misleading. The



Tiger 1200W
\$439
E-Power
www.epowertec.com
● ● ●



FX760E
\$199
FSP
www.fspgroupusa.com
● ●



Kingcraft 1000
\$369.99
FSP
www.fspgroupusa.com
● ● ●



Silencer 750 EPS12V Quad
\$199
PC Power & Cooling
www.pcpower.com
● ● ● ●

1000W continuous wattage spec is rated at a chilly 25 C. If FSP rated this PSU as PC Power & Cooling rated its 1kW unit—continuous wattage at 50 C—it would be called the Kingcraft 850.

This PSU has 8- and 6-pin PCI-E connectors to run a pair of R600s. However, its two 8-pin PCI-E plugs don't split down to a 6+2-pin configuration, so I had to use adapters (not included) to run my two 8800 GTXs. The Kingcraft will be Crossfire-certified up to the model referred to as GFX at this writing, FSP says.

In my top system, 3DMark06's loading screens displayed some funky colors, perhaps indicating that the graphics cards weren't getting the clean juice they would have liked. However, the demos themselves looked fine, and although case temps were markedly elevated on its watch, the Kingcraft 1000 proved stable for three hours.

PC Power & Cooling Silencer 750 EPS12V Quad

PC Power & Cooling is very pointed about why it believes its power supplies are superior. Founder Doug Dodson built industrial power supplies for harsh environments for nigh on two decades before turning his expertise to the consumer PC market, and it shows in the company's products.

Big capacitors on the input side can better survive momentary power losses and brownouts (holdup time). Big capacitors on the output side offer stability under sudden load changes, such as when F.E.A.R. gets graphically intense (transient response). A rear fan doesn't take away space for big heatsinks

like a bottom fan would. Inductors and capacitors carry high temperature ratings, such as 105 C. All PCP&C units are tested in a 40 C oven at a 110% of maximum load at 90V instead of 110 to 120V, which means the PSU has to draw more current (and endure more heat) to supply the same wattage.

Thus, it's not surprising that this PSU supports "all CrossFire setups, including new products that are shipping this spring." I confirmed that all R600 variants are included in this pronouncement. At \$199, this is a best buy indeed.

PC Power & Cooling Turbo-Cool 1KW SR

It's probably the best you can get, but you'll pay for it. At half a grand, this PSU retails for more than most of us have ever spent on a graphics card. Heck, I've seen entire PCs for less.

This single-rail über PSU is long, both in case dimension and generous cable length. If you don't have 11.5 inches between the back of your case and your bay-mounted drives, don't bother. The company throws in some 6- to 8-pin PCI-E adapters, so you won't have to worry should your wallet have enough cash left over for an R600.

There are cheaper alternatives with more connector flexibility. Many of them may offer service that's just as reliable and long-lived. But if you want ample headroom for overclocking and future upgrades (not to mention world-class stability), consider this unit an investment.

Tagan TurboJet TG1100-U96 1100W

Surprisingly, this PSU couldn't reliably run my top system despite its 1,100W continuous rating. Under a

load with a measured peak of about 800W, well within the Tagan's specs (although under hotter conditions), it repeatedly rebooted my system within 15 to 30 minutes.

Tagan told me that the shutdowns were results of overly aggressive OCP, OVP, and OPP (yeah, you know me: overpower protection) circuits. If any one component goes over spec, Tagan says, the PSU shuts down to protect users' systems from damage.

I would point out that the TG1100-U96's continuous wattage rating of 300W higher than my PC's charted peak draw indicates: at least one component in my eval unit was underperforming; the protection and/or rail power sharing circuits need to be re-evaluated; and/or Tagan's wattage rating should be tested in a more real-world environment. I'd say it's definitely at least the last one. In the test report Tagan supplied with the unit, I noticed that the "High Operating Temperature Tests" were performed at 35 C (95 F)—hardly a high temperature in my book.

Topower makes Tagan PSUs, and MaxPoint GmbH in Germany sells them. This one's main cables were barely long enough in my oversized tower case. It comes with a ground strap that attaches to a motherboard retention screw, so I used this during testing.

In short, the TG1100-U96 features six rails with automatic power sharing, EMI reduction sleeving, two transformers, and a three-year warranty with free phone support. It even comes in a quaint little leather suitcase. Not that you'll be carrying a bare power supply around with you, but it's a nice freebie that you can use for other things.

Watt, Me Worry?

PC Power & Cooling's 1KW SR is the top dog here, but you can't rule out the Enermax Galaxy DXX 1000W and Cooler Master Real Power Pro 1KW for \$130 to \$180 less. For power on a budget, get the PCP&C Silencer 750 and never look back. ▲

by Marty Sems



Turbo-Cool 1KW SR

\$499

PC Power & Cooling

www.pcpower.com



TurboJet TG1100-U96 1100W

\$349

Tagan

www.tagan.com



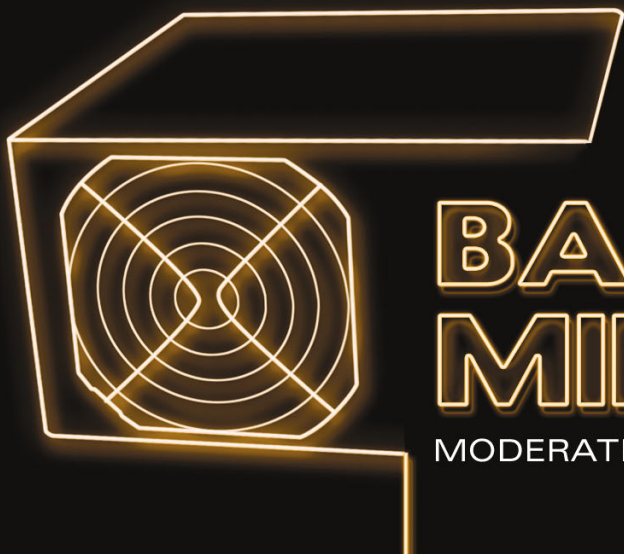
High-End PSUs

Disclaimer: CPU does not recommend running any PSU beyond its continuous wattage rating and temperature. All SLI and CrossFire certifications are for graphics cards on the market as of late February. CPU's test PC differed from those used for certification. Fan locations assume mounting in a traditional

tower case where a cable side of "plug" means toward the motherboard tray and "fan" means toward the opposite side panel. Efficiency peak ratings without qualifying wattage levels often apply at half a PSU's rated continuous wattage, such as 80% @ 500W for a 1kW unit.

	Cooler Master Real Power Pro 1KW	Enermax Infiniti 720W	Enermax Galaxy DXX 1000W	E-Power XScale 750W	E-Power Tiger 1200W	FSP FX 760E	FSP Kingcraft 1000	PC Power & Cooling Silencer 750 EPS12V Quad	PC Power & Cooling Turbo-Cool 1KW SR	Tagan TurboJet TG1100-U96 1100W
Rated continuous (W)	1,000 (50 C)	720 (40 C)	1,000 (50 C)	750 (50 C)	1,200 (50 C)	700 (35 C)	1,000 (30 C); 850 (50 C)	750 (40 C)	1,000 (50 C)	1,100 (45 C)
Rated peak (W)	1,200 (50 C)	800 (40 C)	1,100 (40 C)	750 (50 C)	1,200 (50 C)	760 (25 C)	n/a	825 (40 C)	1,100 (50 C)	1,200 (48 C)
12V rails	6	3	5	1 or 4 (user controlled)	6	4	4	1	1	6
+12V continuous (A)	18 (6x)	30, 28 (2x)	24 (5x)	50 or 20 (4x)	84 or 20 (6x)	18 (4x)	20 (4x)	60	72	20 (6x)
+5V cont. (A)	40	30	30	30	30	30	30	30	30	28
+3.3V cont. (A)	40	25	30	24	30	36	28	24	24	28
Manufacturer (per UL file #)	Enhance	Acbel Polytech	Enermax	Topower	Topower	FSP	FSP	PC Power & Cooling	PC Power & Cooling	Tagan
SLI certified to	pending	2x 8800 GTX/ 7950 GX2	pending	pending	pending	pending	pending	2x 8800 GTX	2x 8800 GTX	2x 8800 GTX
CrossFire certified to	pending	2x X1950/ X1900	2x X1950/ X1900 (EGA 1000EWL)	2x X1900 (per E- Power)	pending	pending	2x X1950/ X1900	2x X1950/ X1900	2x X1950/ X1900	pending
Tested stable to	A: 2x FX-74, 2x 8800 GTX SLI	A: 2x FX-74, 2x 8800 GTX SLI	A: 2x FX-74, 2x 8800 GTX SLI	A: 2x FX-74, 2x 8800 GTX SLI	A: 2x FX-74, 2x 8800 GTX SLI	A: failed	A: 2x FX-74, 2x 8800 GTX SLI	A: 2x FX-74, 2x 8800 GTX SLI	A: 2x FX-74, 2x 8800 GTX SLI	B: 2x FX-74, 1 x 8800 GTX
Max wattage tested	766	810	802	865	801	failed at 805	787	788	798	639
Case temp as tested	58 C	58 C	55 C	56 C	56 C	n/a	62 C	58 C	55 C	58 C
Power factor as tested	.99	.99	.99	.99	.94	n/a	.99	.99	.99	.99
Efficiency peak as advertised	>85%	82-85%	80-85%	80% @ 750W	>80% @ 1,000W	>80%	>80%	83%	83%	80-83%
Modular	no	yes	yes	no	yes	no	no	no	no	no
Cable side	plug	plug	fan	fan	fan	plug	plug	plug	center-fan	fan
Fan location	bottom	bottom	bottom, rear	front, rear	bottom	bottom	rear	rear	rear	front, rear
Fans	135mm, <16-25dB	135mm, 80mm; 20-30dB	135mm, 80mm; 20-30dB	2x 80mm, 0-30dB	120mm, 25-35dB	120mm, <23dB	80mm, <30dB	80mm, 22-55 cfm, 26-40dB	80mm, 30-52 cfm, 32-44dB	2x 80mm, 21-26dB
Miscellaneous	Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS	Active PFC, ATX 12V 2.2, EPS 12V, RoHS	Active PFC, ATX 12V 2.2, EPS 12V 2.92, RoHS	Active PFC, ATX 12V , ""v1-4"" EPS 12V, RoHS	Active PFC, ATX 12V v1-6, EPS 12V, RoHS	Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS"	Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS	Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS	Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS	Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS
PCI-E 8-pin	2	1 (6+2)	3 (6+2)	2 (6+2)	2 (6+2)	0	2	2 (via adapters)	2 (via adapters)	2 (6+2)
PCI-E 6-pin	4	3	5	4	6	2	2	4	4	4
Main 12V	20+4-pin	24-pin	24-pin	20+4-pin	20+4-pin	20+4-pin	20+4-pin	24-pin	24-pin	20+4-pin
8-pin EPS12V	1	1 (4+4)	2 (incl. 4+4)	1	1	1 (4+4)	1	1	2	1
4-pin 12V	1	2	3	1	1	2	1	1	1	1
SATA	8	9	18	8	12	6	6	6	6	10
Molex 4-pin	6	9	16	6 (+6 Molex and mini fan only)	7 (+4 via SATA adapters)	6	6	8	8	4 (+4 via SATA adapters)
Floppy 4-pin	2	2 (via adapter)	2	2	2	2	2	1	1	2 (via adapter)
Finish	Gloss pewter	Brushed pewter	Gloss black	Brushed pewter	Gloss pewter	Metallic blue	Gloss pewter	Matte black or copper	Matte black	Matte black
Length including cable bend (inches)	9.5	7	10	8.5	8.5	7	7	9	11	9
Warranty	3 years	3 years	3 years	3 years	3 years	2 years	2 years	3 years	5 years	3 years
Price	\$319.99	\$229	\$369	\$279	\$439	\$199	\$369.99	\$199	\$499	\$349
CPU Rating	●●●●●	●●●●	●●●●●	●●●	●●●●	●●	●●●●	●●●●●	●●●●●	●●●

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT



BARING THE MIDRANGE

MODERATE PSUs EMPOWER, NOT IMPOVERISH

So what if you don't want to spend \$200 on a power supply? Surprisingly, you can run a powerful quad-core, GeForce 8800 GTX SLI system for \$149. But you shouldn't for a number of reasons. Buy a PSU that's rated to handle your PC's load. And actually, the rating should be more like twice the load if you want to hit the efficiency sweet spot.

If your rig is more beer than champagne, so to speak, you don't need super-high wattage. This group of PSUs ranges from 480 to 650W, with a slight detour past a 300W supplemental unit.

How I Tested

You can read my testing methodology in the previous article. Remember, just because a PSU ran stably for me for three or four hours under a heavy load, don't assume it can do so 24/7 or in a warmer room. My testing highlighted each PSU's short-term limitations, not long-term reliability.

Antec Neo HE 550W

Unlike the Antec TruePower Trio 650W, the Neo HE 550W didn't even break a sweat running system B. It's not really a fair comparison, though, as the Neo HE 550W's fan wasn't blocked. I was tempted to try system A just for laughs, but there wasn't a practical

way to add the necessary connectors without dropping several drives.

Of modular design, the Neo has pleasant black mesh sleeving. It outdid its ratings by a large margin in my tests.

Antec TruePower Trio 650W

This contender looks like the grey boxes of yesteryear, an image belied by its twin 6-pin PCI Express and EPS12V connectors. It matches the PC Power & Cooling 1000W's impressive five-year warranty.

The Antec's rear grille grew too hot to touch with system configuration B, a single 8800 GTX. So, of course, I moved the PSU to system A using 6-pin PCI-E adapters (not included). As with many of the PSUs I tested, the Thermaltake case's hard drive cage restricted the Trio 650W's intake. Thus, when the wattage peaked at 799W, this Antec wisely turned itself off instead of self-destructing. Despite being rated more powerful than the Corsair 620W (also made by Seasonic) and PC Power & Cooling 610W, this Antec couldn't match their performance.

After that, the Trio hiccuped once running system B again, this time at idle. Use a case with better ventilation if you choose this 650W PSU.

Cooler Master iGreen Power 600W

Cooler Master hopes that the iGreen Power 600W will appeal to environmentally conscious users with its



Neo HE 550W

\$149

Antec

www.antec.com



TruePower Trio 650W

\$159.95

Antec

www.antec.com



iGreen Power 600W

\$129.99

Cooler Master

www.coolermaster-usa.com



HX620W

\$149

Corsair

www.corsairmemory.com



CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

**FX600-GLN**

\$139

FSP

www.fspgroupusa.com**Silencer 610 EPS12V**

\$155

PC Power & Cooling

www.pcpower.com**XPro 600W**

\$129

Ultra

www.ultraproducts.com

Blue Angel and Energy Star ratings. The company says that the iGreen's Double Forward Switching Circuit technology increases efficiency, which means it needs less energy to run a PC.

Of course, the iGreen's purpose was somewhat at odds with my excessive test platform. The PSU couldn't run even one 8800 GTS OC for long, at least not in my test PC. Also, the 4-pin extension of the 20-pin main power connector sometimes slid out of the motherboard's corresponding header a little, which led to frustrating shutdowns. But if you're feeling green, you might choose to work around these issues.

Corsair HX620W

Corsair claims that this 620W power supply is conservatively rated. In fact, a spokesperson says that AMD 4x4 and 8800 GTX SLI are no problem for it. I'll say: It ran system A for several hours at more than 180W over spec. The HX620W grew hot but never faltered. And this was with the drive cage mostly blocking its bottom-mounted fan.

The HX620W has three 12V rails with automatic power sharing. Its gold-plated connectors address one of the drawbacks of a modular PSU—oxidation of the contacts, which increases resistance and robs power. Note that there are more optional ribbon-style cables than there are headers to connect them to.

Seasonic makes this and a 520W unit according to Corsair's design. It looks like the latter's insistence on quality has carried over intact. Like PC Power & Cooling, Corsair specifies 105 degrees Celsius industrial capacitors. Add the superb five-year warranty, and you have a very smart buy for a pre-R600 build.

FSP FX600-GLN

The FX600-GLN-E is about to replace this model, but FSP says that besides new retail packaging and ATX 2.2 support, the two PSUs are virtually the same.

Despite being rated at a bathwater-like 35 C, the FX600-GLN ran beyond spec for hours at an alarming 61 C. Only FSP's new Kingcraft 1000 allowed the case to reach a higher temp, so perhaps the company should consider some more fan rpm.

This PSU lacks 8-pin PCI-E support, but a 600W unit probably should. Any graphics card that needs 8-pin will need a stronger PSU, anyway.

I have nothing against the FX600-GLN, but the short two-year warranty gives me pause, as does the option of superior Corsair and PC Power & Cooling units for just \$10 to \$16 more.

PC Power & Cooling Silencer 610 EPS12V

Like the 620W Corsair, this 610W unit outdid its specs by a large margin. It ran system A for several hours without complaint. Despite a load 133W heavier than its rated maximum, the Silencer kept on truckin', albeit with a little heat.

PCP&C says that the 610 is certified for all single ATI/AMD cards, including the new R600 family, but there's no CrossFire certificate for this PSU, for what that's worth. To judge by its performance with two 8800 GTXes, however, only R600 CrossFire might be outside its reach in the real world.

Like its 750W and 1KW kin, the Silencer 610 is long. PCP&C says that the extra length actually helps make its Silencer PSUs quieter than they would be otherwise, as there's a space between

the front grille and interior components. This keeps turbulence from forming, which means quieter operation and a fan that doesn't have to work as hard.

Ultra XPro 600W

Here's another decent unit that gamely soldiered on through my tests, even though it was obvious that it would rather have been powering a lesser PC. Its back grille grew plenty hot in system B. That waste heat, the low power factor as tested, and relatively high wattage draw led me to conclude that system B was well on the downhill slope of this Ultra's efficiency curve.

The company also sent me a value unit, the XConnect VS 600W, but I didn't test it because it lacked an 8-pin EPS12V connector. Well, that and the fact that a contact at the company freaked out a little when told that I planned to test the 600W units on a dual FX-74 system.

Hmm . . . Is that guilt I feel? Nope, just thirst.

Watt's Up, Doc?

The darlings of this crowd are the PCP&C Silencer 610 and the Corsair HX620W. PCP&C has the reputation in this space, but the Corsair has a five-year warranty and a higher temp rating. They cost about the same, so your choice really comes down to personal preference (rear or bottom fan, modular or non-modular, and so on). ▲

by Marty Sems

For additional reviews of the Tagan TG-480U01 and FSP Booster X3, go to www.cpubmag.com/33c05/tagan_fsp.

Midrange PSUs

Disclaimer: CPU does not recommend running any PSU beyond its continuous wattage rating and temperature. All SLI and Crossfire certifications are for graphics cards available as of late February. CPU's test PC differed from those used for certification. Fan locations assume mounting in a traditional

tower case where a cable side of "plug" means toward the motherboard tray and "fan" means toward the opposite side panel. Efficiency peak ratings without qualifying wattage levels often apply at half a PSU's rated continuous wattage, such as 80% @ 500W load for a 1KW unit.

	Antec Neo HE 550W	Antec TruePower Trio 650W	Cooler Master iGreen Power 600W	Corsair HX620W	FSP FX600-GLN	FSP Booster X3 300W (w/ Tagan 480W)	PC Power & Cooling Silencer 610 EPS12V	Tagan TG480-U01 480W	Ultra XPro 600W
Rated continuous (W)	550 (50°C)	650 (50°C)	600 (50°C)	620 (50°C)	600 (35°C)	300 (40°C; supplemental)	610 (40°C)	480 (38°C)	600 (40°C)
Rated peak (W)	633 (40°C)	735 (40°C)	700 (50°C)	n/a	n/a	320 (35°C)	670 (40°C)	580 (42°C)	n/a
12V rails	3	3	3	3	4	1	1	1	1
+12V continuous (A)	18 (x3)	19 (x3)	16, 14, 8	18 (x3)	18 (x4)	25	49	28	36
+5V cont. (A)	20	24	20	30	30	n/a	30	48	32
+3.3V cont. (A)	24	24	20	24	36	n/a	24	28	28
Manufacturer (per UL file #)	Antec	Seasonic	Enhance	Seasonic	FSP	FSP	PC Power & Cooling	Tagan	Andyson
SLI certified to	"other," sub-7900 GTX/7800 GTX	2x 8800 GTS/7950 GX2	"other," sub-7900 GTX/7800 GTX	2x 7900 GTX/7800 GTX	2x 7900 GTX/7800 GTX	2x 8800 GTS/7950 GX2	2x 7900 GTX/7800 GTX	Not certified	Pending
Crossfire certified to	2 x X1950/ X1900	2 x X1950/ X1900	Not certified	2x X1950/ X1900	2x X1950/ X1900	2 x X1950/ X1900	Not certified	Not certified	Pending
Tested stable to	B: 2x FX-74, 1x 8800 GTX	B: 2x FX-74, 1x 8800 GTX	D: 2x FX-74, 1x 7900 GTX	A: 2x FX-74, 2x 8800 GTX SLI	B: 2x FX-74, 1x 8800 GTX	C: 2x FX-74, 1x 8800 GTS	A: 2x FX-74, 2x 8800 GTX SLI	C: 2x FX-74, 1x 8800 GTS	B: 2x FX-74, 1x 8800 GTX
Max wattage tested	640	639	601	802	637	712 (entire PC)	803	584	659
Case temp as tested	55 C	55 C	59 C	56 C	61 C	57 C	57 C	48 C	56 C
Power factor as tested	.99	.98	.97	.99	.99	.97 (entire PC)	.99	.96	.95
Peak efficiency as advertised	85%	85%	85% @ 300W; 82% @ 600W	85% @ 340W; 80% @ 620W	>80%	>80%	83%	70 to 73%	85% @ 300W; 79.5% @ 600W
Modular	Yes	No	No	Yes	No	Yes	No	No	No
Cable side	Plug	Plug	Plug	Plug	Plug	n/a	Plug	Fan	Plug
Fan location	Rear	Bottom	Bottom	Bottom	Bottom	Front	Rear	Front, rear	Bottom
Fans	80mm, <18dBA	120mm, 19.5dB and up	120mm, 17 to 28dB	120mm, 18-36dB	120mm, <23dB	2x 40mm, <40dB	80mm, 22 to 55 cfm, 26 to 38dB	2x 80mm, 21 to 28dB	135mm, 30 to 35dB
Miscellaneous	Active PFC, ATX 12V 2.2, EPS 12V, RoHS	Active PFC, ATX 12V 2.2, EPS 12V, RoHS	Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS	Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS	Active PFC, ATX 12V 2.01, EPS 12V 2.91, RoHS	Active PFC	Active PFC, ATX 12V 2.2, EPS 12V 2.91, RoHS	Active PFC, ATX 12V 1.3, BTX 1.0a, EPS 12V 2.91, RoHS	Active PFC, ATX 12V 2.03, RoHS
PCI-E 8-pin	0	0	1	0	0	0	1	0	0
PCI-E 6-pin	2	2	2	2	2	2	2	2	2
Main 12V	20+4-pin	20+4-pin	20+4-pin	20+4-pin	20+4-pin	0	24-pin	20+4-pin	24-pin
8-pin EPS12V	1	1	1	1	1 (4+4)	0	1	1 (4+4)	1
4-pin 12V	1	1	1	1	2	0	1	2	1
SATA	4	4	6	8	6	0	6	4	4
Molex 4-pin	6	6 (+2 fan only)	5	10 (+2 fan-only via adapter)	6	0	8	8	8
Floppy 4-pin	2 (via adapter)	1	1	2	2	0	8	2	1
Finish	Matte dark grey	Grey	Gloss pewter	Matte black	Metallic blue	Matte silver, black fascia	Matte black or copper	Matte black	Gloss pewter
Length including cable bend (inches)	6.5	7	7	7	7	9	8.5	8	7.5
Warranty	5 years	5 years	3 years	5 years	2 years	2 years	3 years	3 years	Limited lifetime
Price	\$149	\$159.95	\$129.99	\$149	\$139	\$89.99	\$155	\$78	\$129
CPU rating	●●●	●●●	●●	●●●●●	●●●	●●	●●●●●	●●	●●●

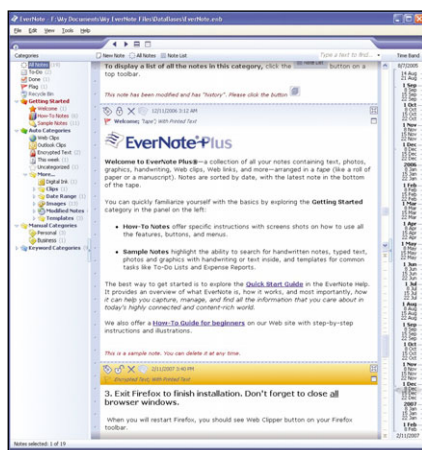
CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT



The Bleeding Edge Of Software

Inside The World Of Betas

EverNote 2.0 Beta 2



There's no shortage of note-taking applications for Windows, but most programs aren't suitable for all users. For instance, some programs are very hierarchical, requiring the user to place every note in a folder, but some folks find this constraining. Others are totally free-form but offer virtually no useful searching, sorting, and categorizing functionality. Some are clearly

Official product name: EverNote

Version # previewed: 2.0 Beta 2

Publisher: EverNote

Developer and URL: EverNote; www.evernote.com

ETA: Q2 2007

Why you should care: Perhaps the best way to store all those little bits of information.

intended for transient thoughts (like "Call Lisa") and look like yellow sticky notes, while others look like miniature databases and make you fill out forms to manage long-term storage. EverNote, however, manages to straddle the fence of almost all these descriptions and even offers free and portable versions, potentially making it the best note keeper for all users.

EverNote organizes notes into a scrollable list called "tape." Notes can contain text and graphics, and there are other note formats, as well, such as shopping list, phone message, and others. EverNote stamps each note with a date and category,

and you can assign multiple categories to any note and even create your own.

The central pane contains your roll of notes you can scroll up and down until you see what you need. To find a note by date, click the Time Band button on the right side of the window and type in a date, or click any month or year in the Time Band to see the notes you've saved. Expand the Category pane to filter all notes in whatever categories you select. The beauty of categories vs. folders is that you can apply multiple categories to a note when appropriate.

EverNote also comes with Web Clipper, which makes capturing parts of Web pages and emails into a note a one-click task. You can password-protect note files and encrypt any text you select within a note with a unique password.

The latest beta works smoothly and looks totally gorgeous. What's more, even the Help file is complete and, well, helpful, making EverNote well worth a look. ▲

by Warren Ernst

JLC's Internet TV 1.0 Beta 5b

More and more TV stations around the world are streaming feeds via the Internet, but locating these feeds and playing them can be a chore for users. Now it's easier to find numerous TV channels on the 'Net in one place with the help of JLC's (Joakim L. Christiansen's) Internet TV.

JLC's Internet TV is fairly straightforward: All you have to do is install the latest version of Windows Media Player or RealPlayer and then run JLCIT. Once you download the program, hundreds of available TV feeds will appear on a list on the right side of the program's window. You can sort these TV channels by name, country of origin, category (such as News, Education, General, and so forth), bit rate, and

comments by clicking the column headers.

To play a TV channel's Internet feed directly in the JLCIT window, just double-click the station in the list. The volume and playback controls will appear directly under video. If you want to change channels, just double-click a new channel from the list.

The latest beta essentially adds more features, including an improved Help file and a new way to update the station list that is more server-friendly. There are also a lot of improvements under the hood to help with future versions. ▲



Official product name: JLC's Internet TV

Version # previewed: 1.0 Beta 5b

Publisher: Joakim L. Christiansen

Developer and URL: Joakim L. Christiansen; www.jlc-software.com

ETA: Q2 2007

Why you should care: If you've ever wanted to watch national and international TV online, this is the easiest way.

by Warren Ernst

SPEED

UP TO

Upgrades That'll Keep You Humming Along

Several programs and drivers get Windows Vista-related refreshes and compatibility updates. But look to cool tools such as VoIP client Gizmo Project, widget KlipFolio, and Yahoo!'s mobile portal for the major feature upgrades this month.

Upgrades

AnyDVD 6.1.3.0

This update adds support for BD (Blu-ray Disc) and fixes various problems including repairing an HD DVD issue.

Get it at: www.slysoft.com

AOL OpenRide 1.5.17.1

AOL's OpenRide software is now open and free for all users, and this version fixes many bugs and improves usability.

Get it at: www.aol.com

CyberLink Vista Updates

CyberLink has created the Vista Updates Center for its entire line of software products to help users download Vista upgrades.

Get it at: www.cyberlink.com/vista

FreshOutline 2.0

This version improves the program's UI with new themes. Also, there are new import and export features, and users can now access recent files directly from the tray menu.

Get it at: www.freshoutline.com

Gizmo Project 3.0

The Internet phone service now lets users customize their avatars and create and join group chats. A new chat history feature records conversations and organizes them by date or contact.

Get it at: www.gizmo-project.com

KlipFolio 4.0

This sidebar-like Desktop tool can monitor weather,

RSS feeds, email, etc. The new version adds a search field, works with Vista, and fixes bugs.

Get it at: www.klipfolio.com

K-Lite Mega Codec Pack 1.67

This bundle of codecs gets many updated elements, including ffdshow, Haali Media Splitter, and QuickTime components.

Get it at: www.codecguide.com

Lightning Download 2.0

LD now supports BitTorrent downloads and has an updated interface.

Get it at: www.lightningdownload.com

Paint.NET 3.01

This update fixes a program crash when saving palettes under certain conditions, poorly displayed launch error messages, and other crash instances. The update also fixes issues with CPU usage when minimizing apps in some cases.

Get it at: www.getpaint.net

Paint Shop Pro Photo 11.2

With this update, Paint Shop Pro Photo supports more camera RAW formats from Konica, Canon, and Nikon models, among others. The update fixes a sudden crash problem, enhances the Search and Organizer functions, and adds new buttons to the toolbar.

Get it at: www.corel.com

The Dude 3.0 Beta 3

The Dude gets new copy and paste functionality in the mapping feature with this update. It also fixes stalling during discovery and problems with the traceroute tool.

Get it at: www.mikrotik.com/thedude.php

Vista Codec Package 4.3.1

The suite of audio and video codecs gets updates for QuickTime, Haali, ffdshow, and XviD. It also improves DVD, FLAC, and MP3 playback.

Get it at: www.msfn.org

Winamp 5.33

This version adds new commands for supporting Unicode, playlist generation, and auto-detection of supported file formats. There are bug fixes for HTML playlists, file cleanup after burning, and playlist loading.

Get it at: www.winamp.com

Yahoo! Go 2.0 For Windows Mobile Devices

This version gives the portal for select cell phones a total overhaul, adding a widget-based interface. Users can now rotate through menu icons to reveal updates to news, entertainment, finance, and connections to RSS feeds and email.

Get it at: mobile.yahoo.com/go

Driver Bay

ATI/AMD Catalyst 7.2

These new drivers for the Radeon series of graphics cards promise to improve performance and launch the Catalyst Control Center faster. Also, the drivers reduce resource overhead and increase stability. OpenGL performance brings 20 to 40% speed gains in some game engines.

Get it at: ati.amd.com

Hauppauge WinTV-HVR-1600 For Vista 1.62

Users can use these drivers to add TV support for Microsoft's Media Center application in Vista.

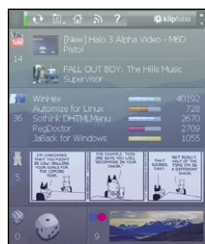
Get it at: www.hauppauge.com

Nvidia ForceWare 97.92

These drivers for the GeForce 8800 GTS/GTX series of cards fix some game compatibility issues and help improve the PureVideo algorithms for video playback quality.

Get it at: www.nvidia.com

by Steve Smith



Remote PC Access Services

Get To Your PC From A Distance

Accessing the data and programs living on your work PC from home or the programs on your home PC from work used to be something of a pipe dream. Fortunately, the combination of always-on broadband, always-on PCs, and low-cost remote PC access services makes this dream a reality.

Remote access has always been available to some extent, starting with Telnet and FTP servers and progressing to VNC (Virtual Network Computing) and products such as pcAnywhere. These products, however, required a certain amount of expertise, time to set up, and if the PC you wanted to access was behind a corporate firewall, an IT department's blessing. The newest generation of remote access services requires none of these things.

The majority of remote access programs work about the same way. After signing up, you install a small applet on your PC that communicates with the remote access program's connection server. The applet tells the server what your IP address is (this can change if your Internet connection uses DHCP), if your PC is online, and what accounts the server can access on it. The host application communicates both ways via port 80. On the remote side, all you have to do is log into the remote access service, click into your host machine, and then just interact with it via a Web browser. Almost all remote access programs allow for full remote control and file transfers.

For this roundup, I tested four remote access services on a Windows PC, a Linux machine, and a Mac, comparing their speed, features, and prices to those of more "traditional" remote access options. I used connections between a 6MB/768KB DSL line and a corporate

environment with multiple T3s, as well as a LAN-only environment using several computers with CPUs that ranged in speed from 1.5 to 3GHz.

Citrix Online GoToMyPC 6.0

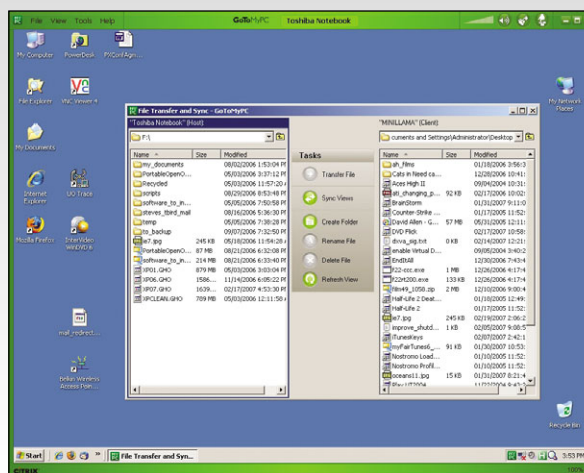
Citrix Online didn't necessarily invent this software category with its GoToMyPC service (in fact, the company didn't even invent GoToMyPC—it bought the service in 2004), but it certainly popularized it with years of radio and TV commercials. In some ways, GoToMyPC is now the Kleenex or Xerox of remote access programs. Even though GoToMyPC is the most expensive program in this roundup, it's unquestionably the most feature-filled and the fastest (tied with LogMeIn for speed).

GoToMyPC starts off on the right foot with a straightforward installation routine for the host applet. After signing up, the screens make it clear that you should be on the computer you want to control remotely and then begin downloading and installing the program. (Other products in this roundup, such

as LogMeIn, take this process for granted, leading to user confusion.) As you download GoToMyPC, the program's users guide is immediately available for download via a hypertext link, and several windows will pop up warning you that you need to allow the host app access to the Internet through any software firewalls you're running. The host applet consumes 14MB of RAM while idle, 48MB while active, and you can shut it down to free up all PC memory when necessary.

GoToMyPC's remote control is pleasingly fast; for example, there wasn't any lag when I was typing in a word processor, and surfing the Web remotely (although slower than normal) is tolerable. Remote control normally takes place within a standalone applet that automatically downloads and launches in Windows. Mac and Linux users will need to use a Java-based "universal viewer" that is just as fast but gives up a few extra features I'll discuss next.

File transfers between the host and the client take place with a somewhat



GoToMyPC 6.0

\$19.95 (per month, per PC)

Citrix Online

www.gotomypc.com



Traditional Remote Access Options

Just because there are updated ways to access your PC remotely doesn't mean the old methods aren't worth considering. Although ease of setup isn't among their strengths, older remote access options do have other advantages.

pcAnywhere. Symantec's pcAnywhere 12 (\$199.95; www.symantec.com) is a fine choice for remote controlling a PC over a LAN, especially when IP addresses don't change or you use a workgroup. Because there's no centralized server that needs to establish communication, remote control speeds can be excellent. Additionally, pcAnywhere is now fully compatible with Windows, Linux, and Mac OS X host machines *and* clients—all the newer remote access services only allow Windows hosts. pcAnywhere also works over a conventional dial-up modem connection (the software answers the phone and establishes the connection itself without the Internet) and even via serial and parallel cables.

Using pcAnywhere over the Internet is trickier than using newer remote access programs via the 'Net, but it's not impossible. First, if the host machine's IP address changes regularly, you will then need to subscribe to a dynamic DNS service (such as TZO.com or

Sitelutions.com, among many others) to link your ever-changing IP address to a static domain name. Next, you'll need to open up ports 5631 and 5632 on your firewall, and if you use a software firewall, you'll need to allow pcAnywhere to do its remote control magic between the local and remote computers.

Because pcAnywhere can essentially do everything the newer remote access services can, the main benefit is that you pay a one-time price for the software. The license is for one host and one client, strictly speaking, and additional licenses are available at a reduced cost.

VNC. VNC (Virtual Network Computing) has been around for almost as long as pcAnywhere. Its remote control abilities are very robust, it can work on multiple computer platforms, and there are many open-source VNCs to choose from. The same dynamic IP address issues that plague pcAnywhere apply to VNC. Also, you have to open your firewall ports 5900 to 5906 and 5800 to 5806 (generally speaking; check the documentation) to use it. VNC usually doesn't have the ability to transfer files and is frequently slower than the competition, but it's hard to argue with free. ▲

slow, two-pane file manager, but you can also drag and drop files and folders between your desktop and the remote desktop if you use the standalone applet. You can also synchronize a set of folders automatically, but these won't work with the universal viewer.

Beyond the basics, GoToMyPC offers notable extras. For starters, its remote control lets you seamlessly transfer clipboard contents among PCs. Sounds also transfer among PCs, but on my system, streaming an MP3 reduced the speed of other functions during playback, so consider sound transfer best for simple sounds such as beeps. Remote printing works as Citrix Online says, meaning if you click the Print button in the word processor you're controlling remotely (be sure to designate your printer first via GoToMyPC's setup screen), the document will print on the printer next to you.

Running online meetings is a pleasure with GoToMyPC. To invite attendees, right-click the host app's icon in your Taskbar, select Invite Guest, type in an invitee's email address, choose an expiration time, and you're all set. All the recipient has to do is click the hypertext link in the email they receive and he will almost

instantly see your Desktop. Once your guest arrives, you can grant him view-only access or let him have full mouse and keyboard control. There's also a whiteboard and chat window available for you and him to communicate more effectively.

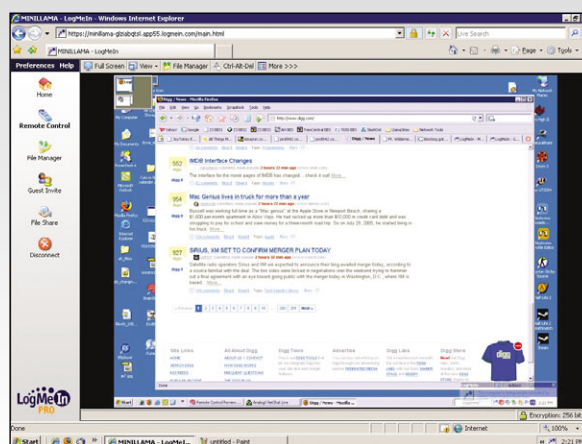
Overall, GoToMyPC offers a solid package for a premium price. It's a fast, compatible, glitch-free remote access service that's justifiably the benchmark to which all other remote access programs should be compared.

LogMeIn, Inc. LogMeIn Pro

It was only a matter of time before the creators of RemotelyAnywhere (a tool

for administering and remote-controlling Windows servers) would repurpose their technology and build a remote access program called LogMeIn. Although LogMeIn is new, it feels like a quality, polished, evolved system—mostly because its underpinnings have been in use for several years.

LogMeIn Pro has an interesting pricing structure: For \$12.95 per month for one PC, you get access to all of the program's features, which are more or less equivalent to GoToMyPC's. However, there's also LogMeIn Free that only offers remote control, but you can install it on as many computers as you



LogMeIn Pro
\$12.95 (per month, per PC)
LogMeIn Inc.
www.logmein.com



like. For many situations, such as helping a family member fix his or her computer remotely, LogMeIn Free is a very appealing option.

The installation routine for LogMeIn Pro is straightforward, but it doesn't hold your hand quite as well as GoToMyPC, in the sense that it's up to you to find instructions on the Web page and find the users guide yourself. To be fair, however, there really aren't that many installation options, and LogMeIn is able to configure the Windows firewall automatically. LogMeIn's host app consumes 15MB of RAM while idle, 38MB while in use, and 4MB while disabled. You can't cleanly turn the host app off without using a tool such as msconfig; fortunately, though, when you do disable the application, it's totally inert.

About as fast as GoToMyPC over the Internet and even faster via a LAN connection, LogMeIn's remote control is about as good as it can be. To add a few conveniences, LogMeIn gives you the choice of either installing an ActiveX control for Internet Explorer or an extension for Firefox. Even without them, however, the universal Java applet enables all features and works in Windows, Mac OS X, and Linux without problems. Web browsing from the host machine is almost pleasant with LogMeIn, and typing in a word processor is almost as fast as actually being there. Remote printing works fine, and the host's print dialog box displays the local printer's name—a neat trick.

LogMeIn's remote file manager is lightning fast because it runs as a Java applet on the local machine rather than as a program on the host machine. Folder synchronizing is set up here, too, and it works as LogMeIn's Web site says.

As with GoToMyPC, LogMeIn offers a Guest Invite feature to conduct online meetings and demos. You have to be present at the host machine in order to send invitations and accept guests to a meeting. You can also grant guest access to other LogMeIn users, which is useful if you regularly want to grant one or more others remote access. Also useful for downloading files too large to attach to

emails is File Share, which lets particular users download specific files directly from the host machine.

With better pricing and equivalent (or better) performance and features, LogMeIn is poised to become the new standard in remote access software. What's more, LogMeIn Free makes trying it out an easy proposition for casual users.

LapLink Software LapLink Everywhere 4

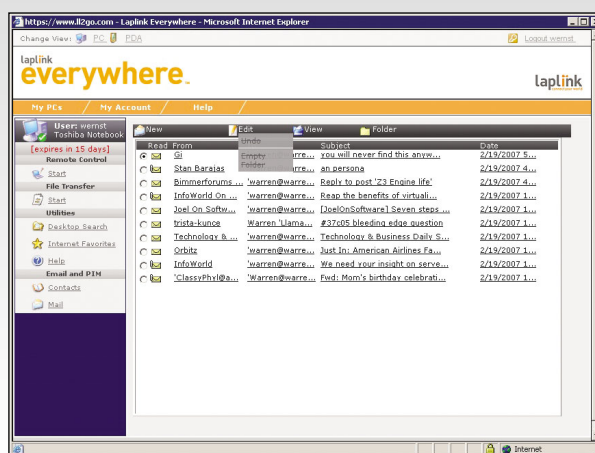
LapLink started life as a DOS program that let two computers share files via a special parallel cable; however, LapLink Everywhere is decidedly more advanced. For \$10.95 a month per PC (unlimited remote access), LapLink Everywhere offers remote control, remote file access, and several exceptional features, such as email and Google Desktop Search access. That said, LLE suffers from some clumsiness in areas the competition has perfected, so it is only worth considering if you really need some of LLE's unique features.

Installing LLE's host app is a bit confusing because there are actually two and a half host applications. The main host app, RC4 (Remote Control 4), is augmented by enabling Windows RDP (Remote Desktop Protocol) and downloading and installing a licensed version of LapLink Secure VNC. Unfortunately, each module has its own password and auto-startup configuration, so keeping them straight is a challenge. RC4 consumes 24MB of RAM (either idle or active), while RDP and VNC use 2 to 10MB more than RC4.

These multiple modules are necessary because RC4, arguably the fastest connection method (which is still slower than GoToMyPC and LogMeIn), only works with IE. The VNC daemon works with all browsers and OSes, but it's slow and can't transfer files. RDP-based remote control is faster in some ways (such as typing) but slower in others (such as scrolling) and can't transfer files; only works with Windows clients; and frequently introduced on-screen glitches while I was using it. The file transfer module only works with IE. LLE performs folder synchronizing with this module, as well, but it works quickly and supports Desktop drag and drop.

Provided you use Outlook or Outlook Express, LLE really shines when it comes to accessing your email and calendar. LapLink Everywhere interacts directly with your inbox and other PIM-like information (such as your contacts and tasks) and displays all of it in a Web mail-like interface—even from Firefox or alternative OSes. This interface lets you read incoming messages, as well as archived messages previously stored in folders. Also, you can create new messages and send them out and even add attachments and reference your address book while using LLE. If you have Google Desktop Search installed on your computer, you can search for files on it and access your Favorites from IE.

If what you really need is regular access to your email and PIM information and only occasionally need remote



LapLink Everywhere 4
\$10.95 (per month, per PC)
LapLink Software
www.laplink.com

control, LapLink Everywhere is certainly worth considering. As a full-fledged remote control and access application, however, it finds itself at a disadvantage.

WebEx Communications WebEx PCNow

WebEx has built a nice-sized online family of business-oriented products, so it's not surprising to learn that its remote access software is business-oriented, as well. Even though WebEx PCNow doesn't offer as many features as the competition, it does have levels of security that are unique to the industry—and all at an attractive price of \$12.95 per month for one PC.

Installing PCNow's host app is a quick and painless procedure, and the setup program immediately lets you access one of PCNow's distinctive features: application-level access control. With this feature, you can grant remote users access to only the programs you designate, which should ease your mind if you're worried that someone may try to steal your valuable information while using remote access. The host app uses up to 27MB of RAM when active, 13MB while idle, and 2MB when disabled.

Remote control speeds were acceptable when I was typing but abysmal when I was doing any graphics-intensive operations, such as moving a window or scrolling through a Web page. WebEx Communications' Web site says (as of this writing) that PCNow is compatible with "any Web browser," but this wasn't the case when I tested the program; IE required an ActiveX control, and Firefox required a plug-in I had to install. Furthermore, I could only install the Firefox plug-in using a separate Windows installer, which most Internet kiosks and/or Internet café computers don't usually permit. Obviously, this sort of installer is incompatible with Mac and Linux versions of Firefox, but even Safari, which WebEx PCNow's site lists as a compatible browser, never got past the online browser check, effectively ruling out any Mac remote access. As with all of the remote access programs in this roundup—except for LapLink

Remote Access Program Features: A Quick Rundown

	GoToMyPC	LogMeIn	LapLink Everywhere	WebEx PCNow
Price per month, per PC	\$19.95	\$12.95	\$10.95	\$12.95
Remote control speed	Fast	Fast	Medium	Medium/slow
Local printing?	Yes	Yes	No	Yes
Email/PIM direct access?	No	No	Yes	No
Callback authentication?	No	No	No	Yes
Sound over remote control?	Yes	No	No	No
Guest access/meetings?	Yes	Yes	No	No
Limited access to specific programs?	No	No	No	Yes

Everywhere—WebEx PCNow supports remote printing that works fine even though you have to select the printer named "ActiveTouch Document Loader," which isn't intuitive.

File transfers using PCNow take place via a file transfer program running on the local machine, so they run fast. On the downside, you can only start file transfers from the remote control window, which takes some time to get started. Furthermore, there are not any provisions for synchronizing folders or dragging and dropping files.

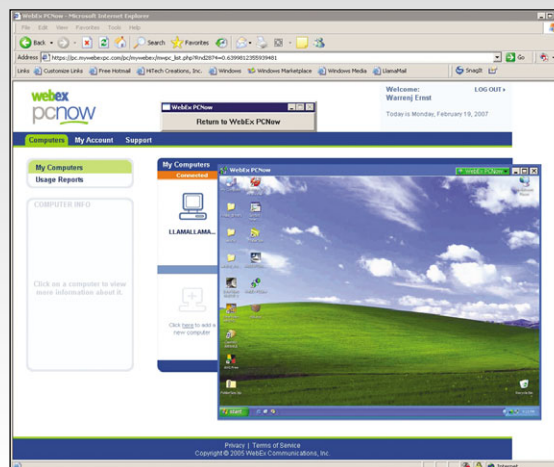
Although it doesn't have any built-in guest access or file-sharing abilities (other WebEx Communications products do offer these types of features), PCNow does offer a unique security model: a phone authentication service. After you set up the program and first attempt to access a PC, the WebEx server will call your telephone. You'll then

have to use your phone to enter the correct passcode to access the computer. WebEx PCNow also prominently displays the username in the access logs, making it more accessible than the other programs in this roundup.

The Verdict

Unless you need the specialized features that come with LapLink Software's LapLink Everywhere 4 or the extra security WebEx Communications' WebEx PCNow provides, both Citrix Online's GoToMyPC 6.0 and LogMeIn Inc.'s LogMeIn Pro are fine choices. Overall, however, LogMeIn Pro gets the nod for the best combination of speed, platform compatibility, ease of use, and features. What's more, LogMeIn is slightly less expensive and offers a remote control-only free version. ▲

by Warren Ernst



WebEx PCNow
\$12.95 (per month for one PC)
WebEx Communications
pcnow.webex.com
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WinZip Computing WinZip 11.0 Pro

Raise your hand if you've used WinZip. Pretty much everyone, right? Now, lower your hand if at some point you left WinZip for an alternative archiver that does more for less. A lot less hands left, huh? If you've only extracted the occasional file with WinZip lately, additions in 11.0, including a capable Best Compression setting, put it on a more even playing field with the competition. Whether these are enough to sway you back is another story.

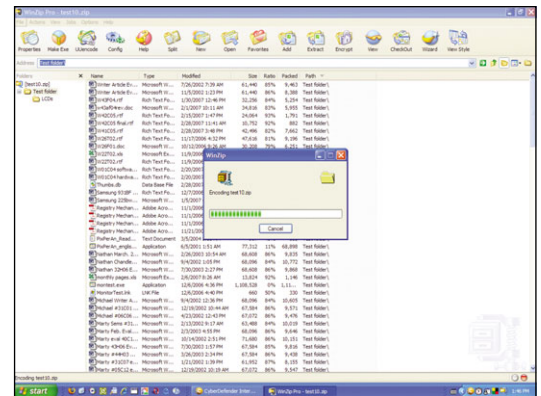
WinZip stuck 11.0's best new features in the Pro version, a \$20 leap from the Standard (\$29.95) flavor. Both include new thumbnail viewers (no need to extract images), a new algorithm for shrinking lossless WAV files, and new support for extracting BZR and RAR files. Pro gives you a full-image viewer, FTP uploading, CD/DVD burning abilities, command line support (albeit via an add-on), and improved backup and automated tools (email notifications, automatic sending of ZIP files, FTP folder searches, etc.) via the Job Wizard.

Best Compression essentially extends WinZip's inclusion of PPMd and bzip2 compression options in recent versions to let 11.0 auto-select the best option based on the files you provide. (A caveat of using Best Compression is that extracting its resulting ZIP files requires a compatible archiver, such as WinZip 10.0 or newer.) Among my various tests, WinZip compressed a 301MB test folder of mixed files to 110MB at its Legacy (Zip 2.0) setting. With Best Compression on, the same folder archived to 83.6MB. WinRAR (\$29) archived the folder to 94.9MB (RAR) at normal and 94.3MB (RAR) at best. 7-Zip (free) shrank the folder to 84.5MB (PPMd) at normal and 84MB (PPMd) at its maximum setting.

Elsewhere, WinZip's Windows Explorer-like navigation is wonderful, and being able to associate alternative extensions to WinZip to work around email filters is a nice touch. Still, power users who argue their archivers equal or

better WinZip's tools and security (11.0 includes up to 256-bit AES encryption) for fewer bones than 11.0 Pro have a strong case, even if registered users get a 50% price break upgrading to 11.0 (\$14.95 Standard; \$24.95 Pro). ▲

by Blaine A. Flamig



WinZip 11.0 Pro
\$49.95
WinZip Computing
www.winzip.com
●●●●●

Tripower Software Tripower

Tripower Software throws out some impressive numbers to entice you to tap into Tripower's, uh, power. Though the 90-day free trial is best for judging the file manager, the numbers are noteworthy, as Tripower Software claims the app can access, organize, and control up to 35 trillion files (including across networked drives) in only three clicks. That Tripower does this from one window may be better.

To organize files, the app uses three panes: Projects, Topics, and Files. Projects are analogous to filing cabinets that store manila folders (Topics), which store individual papers (Files). Click a Project and its related Topics display in the next pane. Click a Topic and related files appear in the Files pane with names you assign. Click a file, and its host app launches it from within Tripower. Nice. Tripower can store 33,000 Projects, 33,000 Topics for each Project, and 33,000 Files for each Topic.

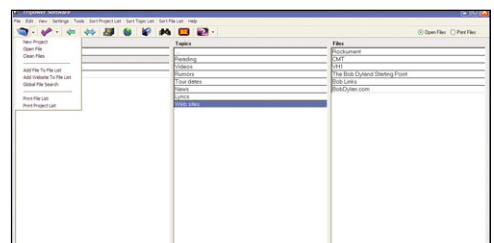
An NFL Football Teams Project is bundled to illustrate the process. For example, click the Official Sites Topic and all NFL team names display in the Files pane, with each name doubling as a URL to the team's site.

Renaming and editing files is easy, and you can use the same file for various Topics, clean up files no longer belonging to a Project, and include mixed file types within a Topic (email addresses, Web sites, etc.). A built-in search engine helps locate files, otherwise you'll add them to Projects from the File menu, toolbar, or right-click menu. Unfortunately, inputting multiple files is time-consuming using the Add File To File List option. Although the ability exists, the company disabled it in favor of overall ease of use. For now, when you add a file, the app assigns it a default name, which the file displays as in the File pane. You can add multiple files at once using the Global File Search option, but you'll still need to

name and accept files individually. The company plans to add automation options in future versions.

Tripower was quick and stable in my testing, and its ability to manage even a dozen or so Projects is stellar. The program supports WinMe and up, with Vista support expected soon. ▲

by Blaine A. Flamig



Tripower
\$29.95
Tripower Software
www.tripowersoftware.com
●●●●●

CyberLink PowerDVD 7.3 Ultra

The pricey Ultra version of this venerable player adds support for HD DVD, BD (Blu-ray Disc), VC-1, Dolby Digital Plus, Dolby TrueHD, and DTS-HD, among other things. However, my enthusiasm is tempered by limitations in the very hardware that would compel you to buy PowerDVD Ultra in the first place.

CyberLink provides technologies to sharpen video, enhance audio, fit a movie into a mobile device's remaining battery time, and even to make subtitles movable. However, many of these features don't work with BD. (I lacked an HD DVD drive during testing.)

PowerDVD's interface isn't as easy to use and intuitive as WinDVD 8's, but it's skinnable. The app did play some BDAV home video WinDVD wouldn't, although both apps can be updated. I tested BD playback with a Sony BWU-100A.

On a Windows XP Pro system with an Athlon X2 4800+, 2GB, a GeForce 8800 GTS, and a standard (not widescreen) 19-inch analog VGA 1,600 x 1,200 CRT PowerDVD played DVDs and SVCDs just fine. However, it couldn't scale BD movies to the screen, instead showing only the upper-left quadrant of the films.

On a Vista system with an FX-55, 1GB, and an analog VGA 1,280 x 1,024 LCD, a Radeon X850 XT wouldn't display any BD video at all. Then again, neither this card nor the FX-55 meet PowerDVD 7's system requirements (!). An 8800 GTS card showed BD movies without cropping, albeit at 720p. This system stuttered during the VC-1 "Corpse Bride," and froze often during the MPEG-4 "X3: The Last Stand."

Finally, I tried a WinXP, dual FX-74, 4GB, 8800 GTX SLI system with a Dell 3007WFP 30-inch monitor. This 2,560 x 1,600 widescreen has dual-link DVI but

supports only 1,280 x 800 over a single-link connection. Frustratingly, playback was limited to 720p because the 8800 only provides HDCP over single-link DVI. A monitor that supports single-link 1,920 x 1080 should work, though.

HD on most PCs still sucks, but it's not PowerDVD's fault. ▲

by Marty Sems



PowerDVD 7.3 Ultra

\$99.95

CyberLink

www.cyberlink.com



CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●● 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

HighSpeed PC

Specialty Computer Hardware

HSPC Tech Station Fast-Access Computer Case!

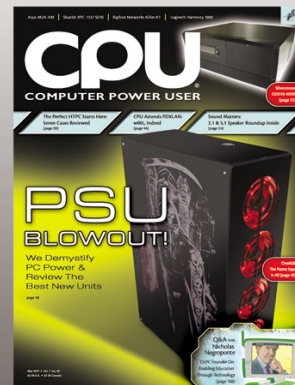
"The Tech Station (patent pending) is a hardware workbench bringing PC parts within easy reach yet keeping them safe and secure. Perfect for PC builders, upgraders, and overclockers."

- New! Secure rubberized motherboard standoffs
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Microsoft Windows Is In Big, BIG Trouble

A few months before this article was published, I posted to my personal blog:

"When I have the time, I'm 'upgrading' from Windows Vista to Windows XP. My keyboard is completely ambiguous. I stand by my original assertion that the shipping version of this OS is late beta, at best. I realize that other enthusiasts are leaving Windows altogether (and leaping instead to Apple's OS X), but there's not yet enough momentum behind my willingness to do that. I'll leave the installs of Vista 32 and 64 on this PC, but I'll spend most (if not all) of my time back in tried-and-true Windows XP."

Since I originally published my primary reasons for switching from Windows Vista back to WinXP (largely related to hardware and driver support issues), three Microsoft community influencers have contacted me privately to say that: (a) they've just switched from Windows to OS X, running Windows as a VM (virtual machine) in Parallels; or (b) they're getting ready to make the switch.

You would be stunned—shocked—to discover who these people are.

Then again, for political reasons, they may choose to keep their switching a complete secret indefinitely (or, at least, not publicize it very much). Why? It's probably the same lynch mob that keeps telling me it's not Vista's fault for my problems; it's either my problem or a problem with third-party developers. Either way, I don't think I can stay with Vista too much longer.

And I really don't think the grass is greener on the other side, either. As tempting as Leopard appears to be, Apple's universe serves up its own set of challenges. I don't want to invest thousands of dollars in new hardware and software only to discover that what I had in WinXP was more than good enough. Then again, the next version of Windows is at least two full years away and will likely be a complete departure from what we know Windows to be today; I'm going to have frustrations no matter what.

I love—and I mean LOVE—Microsoft and many of the people who work there. Hell, if I had a dream job, "Microsoft" would probably be somewhere in the description. Then again,

so would the words "brand agnostic." But Microsoft isn't just about Windows, eh? I freakin' love the Xbox 360s strewn about my house and can't wait to see what's coming in future firmware revisions. I can't wait to see the next version of Entourage on OS X. I'm looking forward to the day my Microsoft Entertainment Desktop 8000 finally ships!

OS X (in complete conjunction with Boot Camp and Parallels) could deal a striking blow to the world of Windows, but the following three impossible things must happen for the market to change significantly:

- Apple must be more competitive with hardware pricing.
- Apple must acquire Parallels and bake it into the operating system.
- Apple must start selling machines with the option of having Windows preinstalled.

If Apple really wanted to change the world:

- Apple should open-source more of its software, like iPhoto and iTunes (or more importantly, the iPod).
- Apple should pause Safari development and pick up the Firefox ball instead.
- Apple should start blogging and start letting its employees blog publicly.

I dunno. It seems that Windows doesn't have much to worry about until those "musts" and "shoulds" become "dids." That'll never happen, so we're back at ground zero. (Sorry, I still do not and cannot see Linux as a desktop OS in the foreseeable future.)

And if I, as a technologist, am undecided, what do you think is running through the minds of Joe and Judy User? I can tell you one thing: The less technically sophisticated you are and the more you live your life online, the easier it is to switch between operating systems.

Microsoft would be wise to start spending more time developing for OS X. There may come a time when the world sees Windows as just that—windows on a desktop of a non-Microsoft OS. ▲



Chris blogs regularly at chris.pirillo.com, entertains geeks in bLaugh.com, drives an experts' blog network at Lockergnome.com, and hosts a conference through Gnomedex.com. Essentially, he lives his life on the Web, with many of his favorite desktop applications having already been replaced by various Internet services. This article was written in Microsoft Word 2007 on Windows XP SP2, but it could easily have been composed in a plain text editor on any operating system dating back to the digital Stone Age.

There may come a
time when the
world sees
Windows as just
that—windows on
a desktop of a
non-Microsoft OS.

You can dialogue with Chris at chris@cpumag.com.

New Paradigms For Computing

For the last time, a car is a car, and a PC is a PC. There's not much similar about how they're made, sold, operated, or used, other than both have ongoing maintenance costs connected to them. Car dealers sell a limited range of configurations. Some things, like roof racks or spoilers, can be dealer-installed, but we can only buy what the manufacturer builds and the dealer stocks. Computers are custom-configured: CPU, RAM, video cards, hard drives are all customizable, and then you choose what software to install, customize, or remove; upgrades to buy; and data to add.

No matter how much we customize our cars, an oil change is always an oil change. Most of us will never do anything to our cars that will cause maintenance to be different or unpredictable, yet there's almost *nothing* you can do to your PC that *won't* change things.

One result of this is the decline of the commercial software business via massive consolidation. How did we get there? Independent software developers could devise faster/better/cheaper ways of solving a problem (for example, editing documents) and then sell that solution. Remember Multimate, Wordstar, XyWrite, and WordPerfect? All were word processors from major vendors within corporate settings.

Every time you installed, upgraded, or changed software or hardware, your computer changes. The virtually infinite permutations invariably include many that don't work. Will WordStar work under Windows 95? Will Lotus 1-2-3 files be readable by Excel? Does dBASE IV work under Windows 2000? With control over OS, Microsoft didn't need to bundle best-of-breed applications in Office so long as consumers were convinced they could minimize the incompatibility problems across OS and applications by buying all their software from one vendor—Microsoft.

Microsoft's domination of the application software market creates an environment with fewer choices and makes it almost impossible for newcomers to make inroads into the desktop software business, at least not in the traditional way.

But what if your computer just worked the way you want it to, right out of the box? You turn it on and instantly access familiar software, configurations, and data. There's no need to back up, restore, install, or reconfigure anything. What if we could get to our desktop from any networked PC?

Most attempts at virtual desktops and work-from-anywhere applications have been experimental or on a small scale, created by small organizations without significant resources to make them viable for real users. Until now. Last year, Google began rolling out a free product line incorporating SaaS (software as a service). This year they announced availability of an enhanced version, with service level guarantees and live support for enterprise users.

Google Apps (www.google.com/a) provides email, instant messaging, calendar, word processing, and spreadsheets. The standard edition is free and gives you 2GB of email storage.

The virtual desktop solution appeals on many levels: There are lower annual software costs, reduced need to purchase desktop and laptop PCs for users who work in more than one location, increased lifespan for older systems, and reduced software purchase and upgrade costs.

Clearly, Google's move attacks Microsoft's business model, and, just as clearly, Microsoft won't stand still for it. The biggest question is whether the Microsoft brand can withstand the attack until its R&D people can come up with a competitive product (or until Microsoft's marketing can kill the challenger).

What does it all have to do with open source? Surprisingly, not too much: Google's challenge is to the commercial PC application software business. You still need an OS to run it. It could be good for Linux (if it becomes available) because it simplifies the task of setting up a PC for general users. Why aren't I using or planning to use it? Because I want to retain control over my data, which raises the single most important question: Could I trust Google with my data? What about Microsoft? Can I trust any third-party provider with my precious data? ▲



Pete Loshin, former technical editor of software reviews for Byte Magazine (print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.

No matter
how much we
customize
our cars,
an oil change
is always
an oil change.

You can get saucy with Pete at pete@cpumag.com.

We're Not Just Playing Games Anymore

The Console Wars Get Wired

Until this generation of video game consoles, connecting an Xbox or PlayStation to the Internet was a kludgy affair best left to hard-core gamers. But now the game has changed. With the introduction of Microsoft's Xbox 360, Sony's PlayStation 3, and Nintendo's Wii, connectivity is a given. All three have Ethernet (through a USB-to-Ethernet adapter for the Wii) and Wi-Fi (an optional add-in for the 360) available. According to Nielsen's tally, even before Sony and Nintendo released their machines, 4.4 million homes already connected their consoles online. And now there are more than dweeby games to lure us online. All three companies are in various stages of evolving their online media and gaming stores, multiplayer gaming, and networking. To be sure, connected consoles are a work in progress, but at least two of the players seem eager to turn game hardware into living room PCs and even set-top boxes. Now that all three brands are in play, we decided to freeze the action in early 2007 to see what we could do with our wired game boxes.

Microsoft's Head Start

Already a year in market, Microsoft's Xbox 360 has had a chance to evolve both its multiplayer online gaming capabilities and its multimedia download system in ways Sony and Nintendo have yet to explore. The 360 has built-in Ethernet and optional 802.11a/b/g Wi-Fi adapters that allow for media downloading and online gaming. An obvious hole in the 360 is its lack of a Web browser for accessing the Internet at large.

Despite the fact that the Xbox 360 lacks a Web browser, many gamers and critics love the consistent interface and ID

system that Live layers across all games; for instance, players' Gamertags are consistent profiles that follow them everywhere. The 360's Dashboard lets users find existing friends to play against and invite others via the interface. With an optional audio headset, players can not only interact vocally in games but can also have up to four private chats running simultaneously with fellow members outside of a game. The optional video cam for the 360 adds video chat capabilities to the mix, as well. In essence, the new Xbox turns your TV into an IP video phone. The multiplayer gaming capabilities and most of the advanced live chat functions in 360, however, require a Live Gold membership (\$49.99 for one year).

Aside from the sleek multiplayer and peer-to-peer communications system, the 360 leverages connectivity to access both big media and users' own small media. In recent months, the Xbox Live Marketplace has become iTunes for TV. Users can purchase individual episodes and entire seasons of TV programs, such as "CSI" and "South Park," and many programs are available in HD. Likewise, users can rent hi-def films on the service. Microsoft refreshes Live Marketplace every Wednesday with new game demos and fee-based arcade games for downloading, as well. The Arcade has proven to be a wonderful place to get simple and casual games for quick playing. But all of this media adds up, and the 360's

modest 20GB hard drive is starting to beg for an upgrade. Some users also find the Microsoft Points system a frustrating way to pay for content. This "stored value" approach redeems cards users buy for cash at retail (about 80 points per \$1).

For well-networked PC fans, however, the real power of the 360 is in its connectivity to their own private cloud. Microsoft is alone among console makers in letting users' gaming rigs stream video, image, and music files from their home networks. By loading Windows Connect on any Windows XP-powered PC, the 360 recognizes connected computers and streams directly from the folders users permit. The system works with MP3s and WMV files and can turn most image files into big-screen slideshows.

PS3: All Networked Up With Nowhere To Go?

As powerful and ambitious as Microsoft's offering is in the market, Sony's PS3's real promise as a connected device is barely visible. In the all-important multiplayer online gaming arena, Sony starts at least with the same limited approach it used on the PS2. Unlike the Xbox Live system, the PlayStation Network is free but sports less of the consistency and out-of-game interactivity that Microsoft has built in. Individual games and publishers are handling much of the player matching and in-game audio chats, so players' experiences could change from game to game. New users can create a unique ID on the PlayStation Network and add friends' IDs into a buddy list.

With a compatible headset and cam (Sony recommends the EyeToy), the PlayStation Network claims the capability to call up buddies on this list to create





John Davison: The Game Console Game

Few people have been in the game of criticism as long as John Davison, senior VP and editorial director at 1Up Network, which is one of the largest hubs of online

game reviews, previews, cheats, files, and features. John has never been shy about telling the big three console players where they went right or wrong.



CPU: Did the console manufacturers get connectivity right with this next generation of consoles, or is it just that the market finally was ready for it?

Davison: Microsoft really nailed it with Xbox Live on the 360, but they were well on the path with the original Xbox. There's some considerable debate over whether such a service should be free or cost, but the key difference between Microsoft's service and the other two is that it's a consistent and robust experience that is part of the standard set for the console. Every game interacts with the community in essentially the same way. It has set expectations across the board.

CPU: Can Sony measure up?

Davison: The online experience is a lot like it was on PS2 in many ways, although now Sony is supporting it with a somewhat more structured environment with the PlayStation Network and the PlayStation Store. Underneath, though, it's still essentially a free-for-all that has more in common with a PC experience than what Microsoft is offering.

CPU: Will the PS3 mimic the 360's new role as a TV and movie download service?

Davison: It's entirely possible. Sony seems very keen to position the PS3 as a digital hub, and given its strengths in multiple types of

entertainment, it's easy to guess what they're likely to try.

CPU: Is Nintendo even in the multiplayer game?

Davison: Nintendo has a very strange attitude toward connectivity. In trying to keep everyone safe, it has created a very obstructive system that's actually more of a deterrent than a security blanket. The notion of "friend codes" that you swap in order to connect online is obstructive and cumbersome.

CPU: Is multiplayer that big of a deal for *all* gamers? Isn't it still a niche pursuit for hard-core gamers?

Davison: It's more than just multiplayer gaming. Online connectivity in games is all about nurturing community and offering services that supplement the games. Multiplayer is key. The fact that 8 million people worldwide are prepared to pay a monthly fee to play World Of Warcraft online is proof that it's not a niche concept. But it's not the be-all and end-all.

audio and video chat rooms. Sony has also joined forces with PC multiplayer chat system Xfire, which will help future game developers build into their titles the ability for players to chat with others outside of the game world as they play.

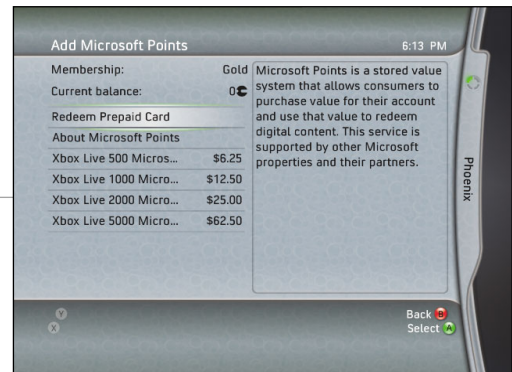
Unlike Microsoft, Sony doesn't let PS3 owners access images, MP3s, and other goodies on their home networks but makes them import such things via USB flash drives, discs, or memory cards. The PS3 has more limited visualizations than the Xbox 360, but the file system is clearer. Managing the folders and directories on a networked PC from the limited interface of the 360 can be daunting for users. Conversely, the PS3 just dumps music and

images into nice thumbnail files in a menu system it borrows from the PSP. The photo slideshow on the PS3 is especially agreeable; it lets photos float on to the screen like paper snapshots, and the full-frame mode lets users pan and zoom easily.

The PlayStation Store of downloadable games, demos, and media was a bit barren as of early 2007. Unlike the Xbox Live Marketplace, Sony uses real money in the

Microsoft's Xbox Live Marketplace uses a stored value system for purchasing game demos, add-ons, and now TV shows and movie viewings.

form of a stored credit card account for charges. What the PS3 does have already that the 360 doesn't is real access to the Web. Anyone who has used the browser on a PSP knows what to expect here.



Typing in URLs via the game controller employs a cell phone-like keypad interface, so it can be tortuous. On the upside, the browser lets you save favorites and even keeps multiple windows open so you can switch among thumbnails. There's no getting around the sheer clunkiness of navigating a browser via a game controller, but a wireless keyboard and mouse add-on could make this a credible living room browser.

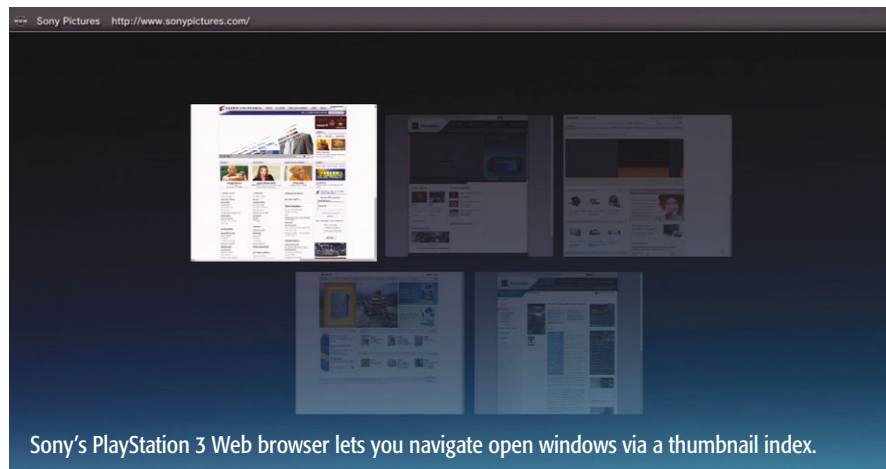
The PS3 right now is all about future power, and Sony's new promise revolves around the upcoming real-time, networked virtual world called Home, which will be like Second Life but more detailed. For example, Home will let players create 3D avatars, live in their own allotted apartments in-world, and even play casual games or watch movies with friends in this world. By the time you read this, Sony should be testing Home, and, as of this writing, the company is planning to launch the virtual world in October. The service will be free, although players may be able to purchase avatar accessories to upgrade their worlds. And, rest assured that this will be a fully realized commercial realm; advertisers will be able to buy promotional space and even create branded worlds.

Wii's Little Engine That Could

With no onboard hard drive and only the promise of online multiplayer gaming, Nintendo does not pretend to share Sony and Microsoft's big media ambitions. All indications are that the Wii online multiplayer system will resemble the Nintendo DS Wi-Fi Connection, where you register specific friends in the system who are safe to play and interact with. Nintendo is scheduled to release the first Wii connected titles in the spring and summer of this year.

Until then, however, it's hard not to love

Coming this fall, Sony will offer a 3D virtual community as a free add-on to the PS3.



the Wii's unique take on connectivity. At the online Wii Shop Channel, players can buy Wii Points or redeem Wii Points Cards they can then use to download Virtual Console games, which opens up a trove of great classic game titles. Besides the Shop Channel, Nintendo offers cool Weather, Forecast, and Photo Channels. But, the winning feature is the Internet Channel that uses a version of Opera to navigate many Web sites. The Wii's Opera browser proved that it was very compatible with JavaScript and Flash by letting us run Google Videos on our TV. On the contrary, when we used the PS3 browser, it choked on some complex site designs, while the Wii browser easily handled most Ajax-oriented sites. Using the Wiimote to type a URL on a virtual keyboard was tedious, of course, but the attractive scaling and compatibility of Opera really makes the Wii an acceptable way to turn a TV into a Web browser.

Just Booting Up

Perhaps the best thing about having connected game consoles that are built

more like PCs is the ease with which the manufacturers can upgrade them. Features such as the Xbox Live Video Marketplace; Wii's News, Forecast, and other Channels; and even improved PS2 game compatibility on the PS3 were all added as downloadable firmware/software updates well after launch. Connectivity turns them into living, evolving platforms that manufacturers can expand at will. ▲

by Steve Smith

Infinite Loop

How To Create Your Very Own Supercomputer

What do you get when you combine eight PS3s? A supercomputer cluster, of course. Dr. Frank Mueller created a cluster of PS3s that not only lets him play games but is also capable of high-performance computing. With about 10,000 PS3s, Mueller says anyone could create the "fastest computer in the world"—and all you'll need is about \$6 million. ▲

Source: www.technologynewsdaily.com/node/6279

firebug.txt

Every now and then an indispensable tool arises from the desolate Internet. A tool so obviously well-thought-out and lovingly crafted that it is destined to be included in the toolkit of all Web developers no matter what part of the development process is listed at the top of their resumes. Firebug is just such an application, and if you stop reading right now and go download it, you won't be sorry.

If my pitch didn't get you, just keep reading. I'm sure many of you are familiar with an older application called Tamper Data. For a long time now, it has been one of the blades in my Swiss Army Knife. Tamper Data monitors the HTTP traffic Firefox sends and receives. It can tell you what requests were required to build the page you are looking at and how long each of them took to resolve. Even more so, Tamper Data can tell you what headers were returned, if something was served from the cache, and tons of more useful information. And, it can wrap all of these things up into a graphical chart that shows you exactly why a Web page is slow.

In the early days of the Internet, it was typical for a Web page to be simply that: a single piece of HTML, self-contained and glorious. But a modern Web application today might contain a dozen images, a half-dozen CSS files, and a smattering of JavaScript files to boot. Once the application retrieves all of that, you might have to make frequent Ajax requests back to your server. That is when Tamper Data comes in to tell you exactly how long each of these requests take. If your image server is running a bit slow, you will know. If your ad server is bogging down, you will see that. You can also use it to debug trickier things such as caching issues or just to make sure that it is zipping data for transfer when appropriate.

But Tamper Data can go bye-bye now because Firebug does all that. But wait,

that's not all. You probably also have used the Firefox add-on called Web Developer. Any developer familiar with the "cascading" part of style sheets knows just how much of a pain it can be to track down just where attributes are being set. With a quick click of Firebug's Inspect button, you can mouse over any item on a page. A box shows you just what you are looking at, and then you can navigate what CSS determines what it looks like. Anyone who has worked on a bigger project with more than a few CSS files will appreciate just how simple it is to make fixes, such as when you are told that the reason a word is blue is because of an attribute on line 324 of something.css.

Positioning attributes in CSS can be a real trick. The attributes that affect exactly where

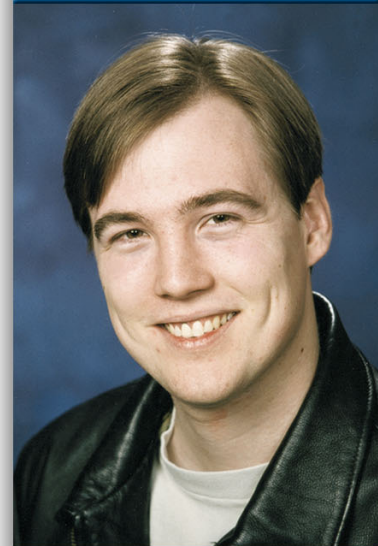


Firebug

something appears include the offset, the margin, the border, and the padding. If you are anal and see something a couple pixels to the right, it can be a real pain to figure out which of these attributes is wrong. But, using Firebug you can simply select the object and look at its layout and it will tell you exactly how many pixels each of these attributes are eating up in all four directions.

Other tools in Firebug will help you, as well. Things such as line by line stepping through JavaScript and breakpoints will make the hellish language at least something more tolerable.

You may have a number of tools that do the things Firebug does, but the program does so many things so well that you may find that it will easily replace all of your tools. You'd be crazy not to install it right now if you ignored me a couple of minutes ago. You won't be sorry. ▲



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

Firebug may
be the
best Web
developer
Firefox
plug-in yet.

Contact me at malda@cpumag.com.

ROAD Warrior

by Jen Edwards

Nokia N800 Offers More Than Portable Internet Access

In many ways, the N800 bridges the gap between traditional mobile phones and UMPCs, offering some of the best functionality of both types of devices in a single unit. Like its predecessor, the N800 isn't actually a mobile phone, although it will be able to make VoIP calls with the Skype client that's expected by the end of June. Instead, the N800 connects to the Internet via Wi-Fi or through a Bluetooth connection with your mobile phone, letting you effortlessly browse the Web, send and receive email (with attachments), use instant messaging services such as Google Talk, view photos, read PDF documents, and stream video and music content through online services.

The device has a number of enhancements, including a full-screen finger keyboard for faster text entry. A Web cam facilitates

real-time video chats, and two SD memory card slots allow for a maximum of 4GB of storage in addition to the 256MB of built-in storage. The N800 uses Nokia's proprietary Internet Tablet OS 2007 and includes mobile versions of Opera, Flash Player 7, an Internet radio application, and an RSS reader.

Battery life is rated at three hours of active use or up to 10 days of standby. The N800 Internet Tablet is currently available for \$399.99 and also includes a stereo headset, travel charger, data cable, storage pouch, and 128MB mini-SD card with adapter. A navigation kit, stereo headphones, and Bluetooth keyboard accessories are optionally available. ▲



Nokia's N800 Internet Tablet nicely fills the niche between mobile phone and laptop, keeping you connected via email, IM, and VoIP when you're on the go.

Jobo Giga Vu Pro Evolution Holds It All

The new Jobo Giga Vu Pro evolution is a photo storage device that does a lot more than free up space on your camera's memory card. Available in 40, 80, and 120GB models, the unit has a CF card slot that supports other popular formats such as SD and Memory Stick (with an optional adapter), or you can connect to a camera via USB. The device has a 3.7-inch, 640 x 480 color screen, and a TV-Out adapter adds the option to view photos or slideshows on a television.

The Giga Vu Pro evolution is also a media player that supports MPEG-1/2/4, MP3, and WAV formats. The unit features a built-in speaker as well as a headphone jack for private listening. The 2200mAH battery lets you transfer as much as 25GB of data on a single charge, and PictBridge compatibility lets the Giga Vu Pro print photos directly without a computer. Approximate prices are expected to range from \$300 to \$500, depending on storage capacity. For updated dealer locations and availability,

visit www.jobo-usa.com. ▲



The Giga Vu Pro evolution frees up space on your digital camera and also serves as a portable media player.

GadgetTrak Aims To Take A Bite Out Of Mobile Crime

A new service designed to protect your valuable electronics has recently emerged. But unlike StuffBak, which relies on the kindness of strangers to call an 800 number to arrange for the return of your device, the GadgetTrak recovery system actively tries to track the location of stolen items such as iPods, USB flash drives, and digital cameras.

After you register your device, just install a small agent file into the root directory of the device you wish to protect. If the device is later lost or stolen, log on to your account and flag it as stolen. If the device is connected to a computer with Internet access, the agent program attempts to contact the GadgetTrak server and transmit information such as the IP address, location, computer name, and ISP host name, which lets you narrow down the location of your stolen device.

The free service is currently in beta testing. For more information, visit www.gadgettheft.com. ▲



The RADIUS is the first consumer device with a display larger than the device itself, thanks to a rollable display.

RADIUS Rolls Out In Europe

Polymer Vision (www.polymervision.com) introduced the RADIUS, the first mobile device with a rollable display, at the 3GSM World Congress in Barcelona. The RADIUS incorporates a 5-inch reflective monochrome QVGA screen into a device that measures 55.6 x 100 x 21mm (HxWxD). The RADIUS accomplishes this feat with a rollable display that unfolds for use and then wraps around the unit for easier storage and transport.

The RADIUS is a "connected reader," offering support for ebooks, email, RSS feeds, podcasts, and audiobooks. You can play audio content through the integrated internal speaker or via headphones and download new content via USB or wireless broadband. Its battery lasts approximately 10 days between charging sessions, and the first model will include at least 4GB of storage. Polymer Vision is planning higher capacities and color screens for future RADIUS devices.

Polymer Vision hasn't released specific format support information yet, and so far the only announcement regarding availability is a partnership with Telecom Italia. Because the RADIUS is equipped with EDGE/UMTS cellular connectivity, it will likely require support from one or more mobile carriers for a U.S. release to be feasible. ▲

WebMessenger Connects BlackBerry, Treo Users

Mobile Instant Messenger is an application that unifies the various IM services such as AIM, Google Talk, ICQ, Jabber, MSN Messenger, and Yahoo!. You can download contact lists from each service and optionally choose to log on to all of them at once when you launch the application. Extended presence information is available, which lets you see which contacts are online/away/busy.

Mobile Instant Messenger is \$5.95 per month; a yearly subscription that includes program updates is only \$29.95. An enterprise version is also available, allowing corporate users to connect to IBM Lotus Sametime, Microsoft LCS, and others. A 15-day trial is available at www.webmessenger.com. ▲



Adtron Ups The Ante With High-Capacity SSDs

Adtron recently introduced the latest addition to its Flashpak line of SSDs (solid state disks). Available in both IDE and SATA, the 2.5-inch drive is now available in a maximum 160GB capacity. With sustained read speeds of up to 65MBps and write speeds of up to 55MBps, A25FB-20 won't keep you waiting to access your data. And since there are no moving parts, SSDs can take more abuse (within reason) than traditional laptop hard drives.

Extra features include the Adtron EraSure utilities that can completely erase all data within seconds, as well as access control features. The ArrayPro Performance engine offers advantages over competitor products by eliminating the need for backup batteries and offering a more application-agnostic approach that maximizes driver performance. ▲

Adtron offers SSD drives in capacities as high as 160GB, ensuring you'll always have plenty of storage.

Enter: Windows Mobile 6

Microsoft has unveiled its latest mobile operating system, Windows Mobile 6. Although it's not a revolutionary change, the latest update does offer some compelling new features, including rich HTML email with live links and a more PC-like display of information and graphics. The mobile versions of Microsoft's Office suite receive a boost, too. For example, Mobile Outlook now includes a calendar bar offering daily and weekly views to help you see the big picture.

All WM6 devices will include Direct Push Technology for email, and Exchange users now have an automatic synchronization option. Enhanced security includes the ability to remotely wipe the data from a device that has been lost or stolen, safeguarding confidential information. Windows Live for Windows Mobile provides a suite of applications, such as Messenger with multiperson chat, Live Search, and Hotmail, and a unified contact list for all Windows Live services, including online/offline availability.

Three versions will be available: Windows Mobile 6 Classic for unconnected PDAs; Professional for Pocket PC phones; and Standard for smartphones (no touchscreen).

Devices based on the new platform should be available starting in the second quarter from AT&T, HP, Motorola, Palm, Samsung, Sprint, Toshiba, Verizon, and others. Existing T-Mobile Dash owners will also be able to upgrade to the new operating system in the near future. ▲

At Your Leisure

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest and most interesting releases in PC entertainment, consoles, DVDs, CDs, and just leisure and lifestyle stuff we (for the most part) love and recommend, read on.

Audio Video Corner

by Blaine A. Flamig



Neil Young—"Live at Massey Hall"

We've loved Neil Young for decades for many reasons, but near the top of the list is Young's newfound generosity for sharing material from his considerable archives. Following the official release of 2006's long-bootlegged "Live at the Fillmore East" comes "Live at Massey Hall 1971," a CD/DVD set featuring the second of two shows Young, a Canadian native, played at the Toronto hall. Young packed this mind-blowing acoustic set with songs that eventually turned up on 1972's classic "Harvest," including a mesmerizing take on "A Man Needs a Maid" that finds Young splicing in lyrics from "Heart of Gold." Stripped down, talkative, and obviously happy to be home, Young displays on "Massey Hall" why even in his mid-20s he was a legend in the making.

\$24.98
Reprise
www.neilyoung.com



Son Volt—"The Search"

As a founding member of Uncle Tupelo (the same band that produced Wilco's Jeff Tweedy), Jay Farrar is as responsible as anyone for moving alternative country to the mainstream. Throughout Son Volt's nearly 12 years, Farrar has stuck fairly close to his country/rock roots, including on 2005's excellent "Okemah and the Melody of Riot." On "The Search," Son Volt pushes the country vibe to the background to instead flavor Farrar's contagious melodies with Stax-like soul-flavored horns, more keyboards, guitar effects, and other surprises. Farrar may never break entirely free of his past, but he's clearly found a new musical direction worth exploring.

\$15.98
Transmit Sound/Legacy
www.sonvolt.net



Casino Royale

Admit it, the Bond film franchise was gasping for air, and Daniel Craig ("Layer Cake") tuxing up didn't inspire confidence it could be resuscitated. Look how wrong we can be. With a body made for the UFC octagon and a shoot-and-ask-questions-later demeanor, Craig's Bond is violent, unapologetic, and locked and loaded. "Casino Royale" finds Bond in the Bahamas, Venice, Madagascar, and elsewhere facing off at the poker table and away from it with Le Chiffre, a blood-weeping, terrorist-aiding financier. With Treasury agent/love interest Vesper Lynd in tow, Craig's Bond not only breathes fresh air into the house that Ian Fleming built, he's the big, bad wolf blowing the sucker down.

\$26.96
Sony Pictures
www.sonypictures.com



Harsh Times

There's a mysterious, repulsive element surrounding Christian Bale's character, ex-Army Ranger Jim Davis, in "Harsh Times" that's simultaneously fear-inducing and alluring. Think of Denzel Washington's Oscar-winning turn as Alonzo in "Training Day"—which "Harsh Times" writer/director David Ayer also penned—and you'll understand the duality the magnificent Bale achieves here. Recently returned to his South Central L.A. stomping grounds from a war he can't shake, Davis sinks into his criminal past, dragging best friend Mike (Freddy Rodriguez, "Six Feet Deep") along. Brutal and bleak, "Harsh Times" puts a bad taste in your mouth you won't be able to wash away for days.

\$29.95
MGM
www.mgm.com

See the full reviews from A/V Corner at www.cpumag.com/cpumay07/AYL

DVD Byte

4/3

The Good Shepherd
Volver
The Brady Bunch:
The Complete Series



4/10

Bobby
The Untouchables:
Season One,
Volume 1
The Streets
Of San Francisco:
Season 1

4/17

The Last King
Of Scotland
Notes On A
Scandal
Smokin' Aces

4/24

The Queen
Little Children
Night At
The Museum

SUPREME™ COMMANDER

Annihilation Without Apology -by Dr. Malaprop

\$49.99 (PC-DVD) • ESRB: (E)veryone • THQ • www.supremecommander.com

In 1997, Cavedog Entertainment released Total Annihilation (TA). Though pretty to look at, the game's mechanics didn't stand out in the sea of RTSes available at the time. However, a few levels of play made it abundantly clear that TA was special. It elevated the genre through in-game unit balance and the tightly woven resource

management model. The use of rendering for the environments, topographical (dis)advantages, real physics, and 150 different unit types (6,000 with the use of additional modded units!) made TA really stand out. The game's charismatic

creator, Chris Taylor (also of Dungeon Siege and its sequel), has seen fit to release Supreme Commander (SupCom) which for all intents and purposes is the spiritual successor to TA.

A storyline was virtually nonexistent in TA; this missing element was unusual when compared to RTSes of the era, including Dark Reign, Command & Conquer: Red Alert, and Warcraft 2, among others.

SupCom improves on TA by including a futuristic plotline as background to the thousand-year Infinite Wars taking place between the three playable in-game factions: UEF (United Earth Federation), Cybran Nation, and Aeon Illuminate. The storyline is not compelling, but the

gameplay is. Each faction has its own unique strengths and weaknesses and features six missions, with each mission segmented into three or four parts. You can play the three campaigns in any order you wish, and the story for each is told from that faction's perspective, which is a nice touch. As you advance through the maps, you'll reel at the size of them (even the small ones). As this occurs, the mechanic of using your mouse wheel to zoom from the unit to satellite level becomes very helpful. SupCom also supports a second monitor, which can be utilized to keep your eye on the satellite map to track battles you're managing all over the map. It's a nice touch that won't go unnoticed by power users. Single-screen users can split their screen to achieve a similar if less impressive experience.

The gathering of resources (Mass and Energy) is streamlined; you can queue commands to create structures and units. This gives you time to micromanage battles rather than constantly juggling resources. SupCom's method of managing resources may very well influence future RTS designs. Your battle will range across land, air, and sea. The units for each race will seem similar in the early missions, but get more interesting as you work your way through the technology trees. You start each game with a control unit called an ACU (Armored Command Unit), which is similar to the King on a chessboard; the ACU is powerful and versatile, but it's game over if you lose it to the enemy. Unit pathfinding can go awry as you build up hundreds of units—but our overall impression of the AI was positive.

The RTS genre was recently redefined as we noted in our 2006 Game Of The Year, Company Of Heroes (also published by THQ), but that doesn't prevent a game like Supreme Commander from pushing the evolution of the more traditional-feeling RTS games. Developer Gas Powered Games doesn't apologize for SupCom's obvious bias to the hardcore RTS contingent because the game does so without compromising accessibility to all but the most novice gamers. SupCom won't disappoint if you had any fondness

for TA. SupCom exceeds expectations, so the same advice goes for anyone with more than a passing interest in RTS games. There's plenty here to keep mind, mouse, and hardware fully engaged—it's not often you find a game that really benefits from multi-core support. ▲



2

GHOST RECON ADVANCED WARFIGHTER

Better In Every Way -by Dr. Malaprop

\$59.99 (Xbox 360) • ESRB: (M)ature • Ubisoft Entertainment • ghostrecon.us.ubi.com/graw2

The games that were most influential during the Xbox 360 launch window were Call Of Duty 2, Ghost Recon Advanced Warfighter (GRAW), and The Elder Scrolls IV: Oblivion. GRAW debuted in March 2006 (see review in the May 2006 issue of CPU magazine) and as the 360's first "serious" shooter, made an instant name for itself for its stunning graphics, challenging single-player gameplay, and solid multiplayer combat. Now here we are, a mere year later, with the sequel. GRAW2 feels like it should be an expansion pack (1.5?) rather than a full-blown sequel. It's obvious that much of the technology from the last game is being leveraged here (technically to better effect), so a \$10 rebate in exchange for an original GRAW UPC code would have been a nice nod to the fanbase.

Those issues aside, GRAW2 addresses the shortcomings of the original while dressing up the visuals. The story takes off on the heels of the original's ending as your homecoming is cut short and your team is rerouted to Juarez, Mexico to foil a nuclear terrorist threat to the United States. It's also about time that your AI squadmates behave smartly in combat and make an effort to stay out of the line of fire; however, they're still not as smart as Rainbow Six: Vegas squadmates.

Experienced gamers that only plan to indulge in the single-player game may wish to rent GRAW2, but this is a must-own for anyone interested in the multiplayer game. GRAW2 features one of the most in-depth multiplayer experiences you'll find on the platform. ▲



JADE EMPIRE SPECIAL EDITION

Does Everyone Love Kung Fu Fighting? -by Dr. Malaprop

\$39.99 • ESRB: (T)een • 2K Games • jade.bioware.com/specialedition

Ancient Chinese Wisdom: It's better to be two years late than a no-show. (Psst, remember Halo and Halo 2 on the PC?)

We originally reviewed Jade Empire on the Xbox (see the July 2005 issue of CPU), so it's good to finally see the game make its way to the PC. It doesn't take long to establish the plot. As a student in a far-removed kung fu school, you learn from your master that you are destined for great things... and danger.

The most noticeable change is the way Jade Empire looks, which is our default expectation for a title that has taken this long to make it to the PC. Jade Empire features exponentially better visuals than the Xbox and makes good use of high-end hardware. The game's artwork

was always attractive on the Xbox, but becomes beautiful on the PC. Despite the greatly enhanced graphics and load times, a couple of new fighting styles, and keyboard/mouse support, Jade Empire is still similar to its original Xbox counterpart.

Jade Empire is a light RPG, and if you aren't expecting a Baldur's Gate or Neverwinter Nights experience, you'll find plenty to enjoy. The game is linear (most novices will be able to beat it in less than 25 hours) and the combat is twitchy for an RPG. But the epic storyline, pretty graphics, Far East environments, and superb dialogue trees make it a welcome pastime if you set your expectations appropriately. It's fodder to keep you occupied until Bioware releases Dragon Age on the PC and Mass Effect on Xbox 360, plus it's a breather from the usual elf and wizard RPGs. ▲



CRACKDOWN

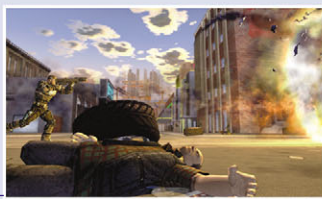
Nice Being The Good Guy For A Change -by Dr. Malaprop

\$59.99 (Xbox 360) • ESRB: (M)ature • Microsoft • www.crackdownoncrime.com

As much as we enjoyed the GTA games, playing the bad guy protagonist in almost every sandbox game becomes a bit stale. Pacific City, which is made up of three connected islands, is being terrorized by three rival gangs (Los Muertos, the Volk, and Shai-Gen), and the law has resorted to bioengineering and cloning its peacekeepers.

You are one such generic rookie Agency cop, and as the game begins you'll be tasked with eradicating the gang menace. This involves taking on progressively tougher street thugs and bosses until the end-game in a graphically stylized open world. How you take down the gangs is up to you. The storyline is instantly forgettable, which makes the gameplay even more important. As you make your way around the city, you'll build up your attributes in strength, shooting, driving, agility, and explosives when you do such things as fire your sidearm, win a car race, collect agility orbs, and set off bombs. As you power up these attributes, you'll become a superhuman cop. There's nothing quite as pleasing as leaping up several flights of stairs or throwing cars at the enemy.

Developer Realtime Worlds boiled down open-world sandbox games, such as the GTA series, to extract those games' core essences—the stuff that made them so enjoyable to play in the first place—and then blended the essence into Crackdown. Crackdown is easy to pick up, but tough to put away. ▲



GOD OF WAR II

Divine Re-intervention -by Chris Trumble

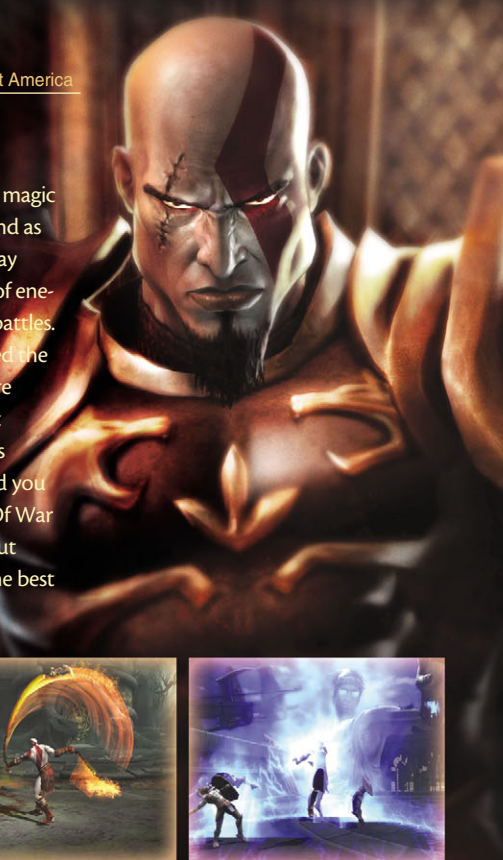
\$49.99 (PS2) • ESRB: (M)ature • Sony Computer Entertainment America
www.us.playstation.com/godofwar2

When we left Kratos back in 2005, he had just accomplished the seemingly impossible task of deposing Ares, the rogue god of war. As a reward for doing Olympus' dirty work, the brooding Spartan became the new god of war, which seemed like a happy enough ending. But anyone who's spent much time on Greek mythology knows the gods are fickle and often as flawed as the mortals they oversee. Add to that Kratos' rampant abuse of his power—he sent his Spartan countrymen on a god-fueled rampage across the ancient world—and you have a recipe for impending disaster, and God Of War II begins just as Kratos is getting his comeuppance.

Like its predecessor, GOWII is a third-person action game for the PS2 featuring lots of fast-paced combat. This time you are working to put down not some minor god of conflict, but Zeus himself, although the essence of the game's combat is the same. Your main weapons are a pair of swords on long chains that slice, dice, and make julienne fries (this time they're called the Blades of Athena rather than the Blades of

Chaos). In addition, you'll have access to some cool magic and a few other weapons as the game progresses, and as before, the game consists largely of working your way through great-looking levels and taking on hordes of enemies until you arrive at the inventive and fun boss battles.

The team at SCE Studios Santa Monica has upped the ante across the board in this sequel. The graphics are more detailed and employ more sophisticated light effects, there are more puzzles and more minigames (including a couple really cool flight sequences), and you can get scads of new attacks and power-ups. God Of War II doesn't stray too far from the original's formula but that's a good thing, and the result is hands-down the best PS2 game available today. ▲



Tune In To . . . Television! Part 2

When we last saw television in our previous column, it had become a hobby of the 1930s, though far from the obsession that was its role from the 1960s and onward to the present. There were numerous stations airing local programs, but all the big money and performers remained in radio and motion pictures. How else, when a cheap but effective radio set cost \$10, while a television sold for anywhere from \$200 to \$1,000 or more? Television was beginning to make its mark, however. The 1933 comedy film “International House,” starring W.C. Fields, had a tenuous plot involving a variety of firms bidding for the rights to a futuristic television known as the “radioscope.” What’s interesting isn’t that television was mentioned and displayed, but that it was just a kicker to events rather than the main theme. By 1933, television had lost its aura of being a marvelous marvel.

Meanwhile, one of the pioneers of early television, John Logie Baird, was actively involved in developing cinema television—the ability to project television pictures in real time on a motion picture screen—and stereoscopic television. The inventor also picked up work again during WWII on high-definition color television, something he had begun back in 1928. Baird called his new version Telechrome, and it was the first color system to completely eliminate any mechanical reproduction techniques. Its public unveiling and demonstration in 1944 was understandably of less interest to the British public than the continued bombing of London and D-Day, however. Baird, who had financed most of his work with the help of a technician who hadn’t been conscripted, died two years later, lacking the health and funds to turn his vision into reality.

One of the early ideas for color that Baird first accepted and then rejected had been rotating filter wheels in primary colors. This was similar to mechanical television, with all the size, adjustment, and breakage problems associated with that invention, but a mechanically based color system was what CBS revealed in 1940 during a live studio pickup broadcast. Created by Hungarian

émigré engineer Peter Goldmark, later president of CBS Laboratories, the system traded great color fidelity for image flicker. But in this respect, the enormous pockets of CBS were just as stymied by wartime conditions and goals as Baird was in the UK, and further developments didn’t really take off until 1946. It was then that the FCC conducted its first hearings into color television to develop a color standard for broadcast, and CBS took the floor.

Whatever its faults, the CBS color system had one great advantage: It was ready to go. Meanwhile, RCA, like Baird, had come to consider the mechanical color system favored by CBS as backward, arguing that because there was already an electronic system in place for black-and-white television, the logical way forward was electronic color. This would keep some level of compatibility with existing black-and-white sets which, not surprisingly, represented an area of huge RCA investment. But RCA entered the fight to set a color standard late in the game, and the FCC judged the color fidelity of its electronic system inferior to that of CBS.

RCA petitioned the FCC to delay issuing any rulings in late 1950. Upon the FCC’s subsequent announcement supporting CBS as a color standard, RCA brought suit against the FCC. It wasn’t until mid-1951 that the Supreme Court upheld the FCC’s right to judge in favor of CBS, but by then, RCA had flooded the market with a huge number of black-and-white televisions that were incompatible with the CBS system. With compatibility issues much greater than before, CBS withdrew, and the FCC reversed its decision. RCA became the standard.

The ramifications of RCA’s clever delaying tactic went far beyond the failure of CBS’ mechanical color standard; color television itself really didn’t take off until the mid-1960s as a result. Color eventually triumphed, of course—just as my father decided to make his first stock investment in a new company manufacturing black-and-white televisions. This would also be his last stock investment, and perhaps that was for the best. He was also fond of mimeo machines. ▲



Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100. It was last seen functioning as a boat anchor.

Color eventually triumphed, of course—just as my father decided to make his first stock investment in a new company manufacturing black-and-white televisions

Wax nostalgic with Barry at barry@cpumag.com

:: MISSION CRITICAL ::

The USAF's B-1B Strategic Bomber is considered to be one of the smallest in its respective class, but yet it is perhaps the most effective war craft that has ever been designed and built per engineered specifications to serve its intended purpose; that is to fly low and fast, penetrating deep inside enemy territories to deliver the deadliest load of bombs, larger in comparable to those of much formidable bombers.



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Software

Tips & Projects

Once More Into New Vistas

We tip writers only get a new operating system to sink our teeth into every few years, so excuse the preoccupation in recent months with Windows Vista. Vista has rewarded us with a trove of hidden settings and undiscovered features, but, for now, this will be our last set of Vista tips.

At Your Services

Advanced WinXP tweakers learned early that disabling select background Windows services could squeeze more performance out of their OS. This is even more important in resource-hungry Vista, which includes even more background tasks and monitors. To disable services, click the Windows icon in the bottom-left corner of the screen to bring up the Start menu, type **services** in the Start Search box, and press ENTER. Highlight a service to bring up its description in the left pane of the Services window. To set a service's startup behavior, right-click the service and select Properties

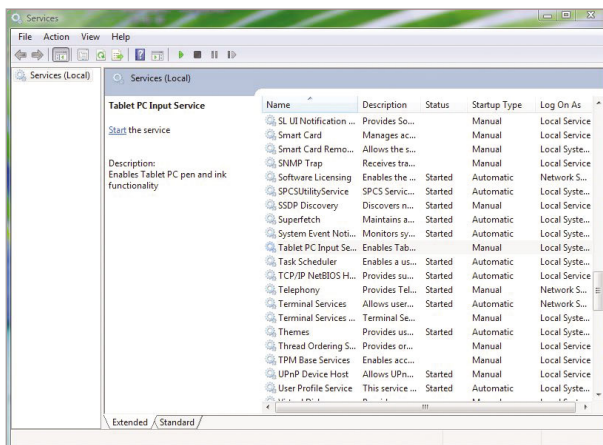
from the drop-down menu. Disabling unnecessary services can give back to your CPU and memory resources that accelerate general computing. But always be careful about which services you stop or prevent from starting in the future. Knowing which services you can safely disable is important. Lucky for you, there's a guide to services in Vista available at SpeedyVista.com.

Raise Your Command Level

Advanced tweakers will probably continue to rely on command windows to access the most arcane Vista operations. The problem is that new security measures in Vista can block command line entries if you don't have administrative access to the commands. To open a command window with higher security privileges, first type **cmd** in the Start Search box. Next, right-click the Windows Command Administrator (CMD) item and select Run As Administrator in the drop-down menu.

If you use the command line frequently, you can also create a shortcut that has the Run As Administrator setting embedded. To do this, right-click the Desktop and select New and Shortcut. In the Type

Vista adds a pile of new services to the system overhead, and many of them, such as the Tablet PC Input Service, may not be necessary on your PC.



The Location Of The Item field, type **cmd** and click Next. Give your shortcut a name such as "Command Administrator" and then click Finish. Now, right-click your new Command Administrator shortcut and select Properties from the drop-down menu. Next, click the Shortcut tab and the Advanced button. Finally, click the Run As Administrator box and keep clicking OK to close all of the windows.

Search It All

As great as Vista's search box interface may be at finding common programs and files located within Vista's default file structure, it actually doesn't scour your entire PC. It may not index material in new folders that you created manually off of the root drive, for instance. To help Vista's search box find common files better, first type **control panel**

WinXP Tip Of The Month

Having trouble shutting down Windows? We often reboot Windows in order to clear a persistent anomaly, unexplained poor performance, or program errors, but these may be the same reasons the system itself won't respond to a simple restart or shut down. If the PC seems to hang after a shutdown command, then press CTRL-ALT-DELETE to bring up the Windows Task Manager. In the window, click the Shut Down menu and choose the command you want. In our experience, we've had the most success using this method to shut down or restart a troubled Windows session. ▲

Registry Tweak Of The Month

Here is our first Vista-specific tip in the monthly Registry tweaks. To eliminate Vista's Windows Mail's annoying and relentless opening splash page, first type **regedit** in the Start Search field and press ENTER to open the Registry Editor. Next, go to HKEY_CURRENT_USER\Software\Microsoft\Windows Mail. Next, right-click Windows Mail, select DWORD Value from the drop-down menu, and name the value NoSplash. Finally, double-click this new value, type **1** in the Value Data field, and click OK. ▲

You can use the Computer Management window to resize partitions and change drive letters.

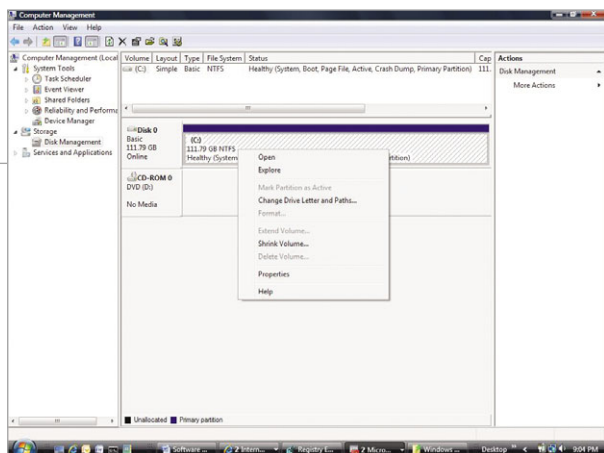
in the Start Search field and then press ENTER. (Make sure you're in Classic View.) In the Control Panel window, double-click the Indexing Options icon. Next, click the Modify button and then the Show All Locations button. In the Change Selected Locations field, double-click Local Disk (C:) to select the specific directories you want to index. Keep in mind that the more folders you include in the index, the longer searches might take. Only select folders that contain data files. You can also speed up your searches by removing the checks from locations you don't need Vista to search.

Over time, Vista's search operations might slow down. In just a few months of populating our Vista rig with files and programs, we noticed that the once-speedy process leaves us waiting longer and longer for results. One remedy is to force Vista to rebuild the index. Again, in the Indexing Options window, click the Advanced button. Next, click the Rebuild button under Troubleshooting and then click the OK button. Keep in mind, however, that this action will initiate a system-wide reindexing of the targeted folders, which can be a lengthy process, so you may want to issue the Rebuild command at the end of the day so it can run overnight.

Search It Like You Say It

Vista's search-based interface is even more

Windows Mail is a powerful replacement for Outlook Express, but its default settings don't leave copies of your messages on the server for retrieval later on your Desktop.



remarkable when you turn on the well-buried option for natural language search. This setting lets the search box recognize queries such as, "last month's photos." To activate natural language searching, open your Documents folder and click Organize and select Folder And Search Options. In the window that pops up, click the Search tab and check the Use Natural Language Search box. Click OK to exit. The Vista search box suddenly becomes quite powerful. You can try queries such as "email to Bill last week" or "email about Sam last month" and probably get an accurate list of messages that parse the sent bins and contents of your email.

Resize Your Partition

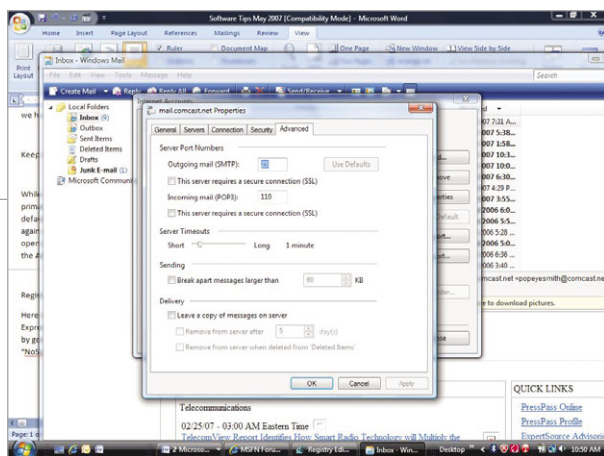
Vista has a built-in partition management system that lets you expand or shrink a partition. To get there, type **computer** in the Start Search field, right-click the Computer item, and select Manage from the drop-down

menu. Double-click Storage to expand that category and highlight Disk Management. Right-click the partition you want to adjust and select the Shrink or Expand command. The OS will calculate available space and let you adjust accordingly in the next window.

Keep Windows Mail In Synchron

Although most advanced users will need a more robust email client than Vista's Windows Mail on their primary Desktop, it's a handy freebie for accessing your email on a notebook. The problem is that by default, Mail doesn't leave a copy of the email it receives on your server, so the messages won't download again when you access the account later from your Desktop. To fix this, open Mail, click Tools, and select Accounts from the menu. Highlight your email account and click the Properties button. Next, click the Advanced tab and in the Delivery section, check the box for Leave A Copy Of Messages On The Server. You can then elect for a time limit on the new policy or have Mail remove messages from the server only when you delete them and then empty them from the trash bin. ▲

by Steve Smith



Infinite Loop

Use The Force . . . As An Umbrella?

The next time you're caught in a rain shower, broadcast your inner Skywalker (or your inner geek) with the Light Saber Umbrella from Funshop. Available in blue, white, and red, these umbrellas will not only keep you dry, but turn some heads, as well. And hey, they might even protect you if you get into a tussle with the Dark Side. ▲



Source: crunchgear.com/2007/02/23/lightsaber-umbrella-for-uberdorks



Warm Up To Penguins

Make Cellular Magic

Do you treat your computer and cellular telephone as indispensable necessities, somewhere between running water and your favorite pair of pliers? Wait until you put the two together; a computer connected to a cellular telephone is way more fun than either alone.

There are lots of ways cellular phones and desktop computing meet—far more than we can list in this month's column. Let's look at one of them with enough care to be sure your own experiments will be successful.

First, we need a few ground rules. Our look at cellular-computer cooperation focuses on command line operations rather than GUI applications. If your usual Linux experience is limited to its GUIs, you'll want a few of the tips that follow. For telephony, Linux is on the undercooked side; you'll achieve the most rewarding results when you can work from the command line.

Dial-up Done Wirelessly

The first way computers and cellular handsets came together in the '90s remains important today. A computer can establish a dial-up connection through a cellular handset. But if you're going to go this route, sign up for a cellular data plan, which will be much cheaper, faster, and more reliable than over-the-air dial-up. However, it's still good to know about dial-up capabilities for occasional use. For a modest cost, you can use your computer and cell

phone to access, at limited speed, anything on the 'Net for a few minutes.

Although it's possible to connect your cell phone and computer together in a variety of ways, using the Bluetooth wireless protocol is actually probably easier than attempting a cable connection. To successfully connect to your ISP (and, consequently, the Internet) from your cell phone over Bluetooth, you need the following: a recent 2.6.x kernel with Bluetooth, `ppp`, and networking enabled; `pppd`; and BlueZ to handle Bluetooth connectivity. The specific configuration we used included a 2.6.15 kernel for Linux, release 2.4.4b1 of `pppd`, and 2.24 of BlueZ.

Along with the installations listed above, you'll also need to configure your handset for connection to your ISP. Don't get hung up on the term "dial-up," either. It's generally not feasible to make an Internet connection through a cellular telephone using the same software as you would for a conventional landline; the process before and after dialing is different. Instead, cellular telephones embed special data-connect software that your computer must interface. Consult your ISP for this vendor-dependent step.

Install Bluetooth

To set up Bluetooth on a Linux box requires a Bluetooth-enabled kernel. All recent major distributions include Bluetooth support in the kernel; you'll only have to make a change if you compiled a

kernel on your own and deliberately choose *not* to enable Bluetooth.

With the right kernel in place, you're ready to install the BlueZ application. BlueZ offers a comprehensive range of Bluetooth-related utilities for Linux. Other distros might have a different installation shortcut, but for Debian-derived distributions such as Ubuntu, you need to log in with root access and type **apt-get install bluez-utils**, pressing ENTER when you finish.

Next, enable your Bluetooth hardware. Whether your computer has integrated Bluetooth capabilities or you have a USB adapter, you need to set a PIN for your computer. To set a PIN of 1234, type **echo 1234 >/etc/Bluetooth/pin** and press ENTER. Your mobile handset will prompt you during its Bluetooth configuration for that same PIN.

Set up the connection

Next, enable Bluetooth on your mobile phone and set it to Discoverable, which lets other Bluetooth devices detect your mobile phone. (Remember to turn Bluetooth off after you finish using it because it's too easy for an intruder to harm an unattended device with live, unguarded Bluetooth capabilities.)

Next, scan your Bluetooth neighborhood. Although such GUI utilities as KDE's Konqueror make scanning possible, we'll focus on the command line. After we typed **hcitool scan** and pressed ENTER, we received the following output:

```
Scanning . . .
00:02:72:04:16:9E  HESUS
00:09:2D:2C:A2:1B  mHesus_new
```

In this case, the `mHesus_new` device is the one we're interested in. Then we scanned for dial-up networking services. We typed **sdptool search --bdaddr 00:09:2D:2C:A2:1B DUN** and pressed ENTER to receive the following output:

```
Searching for DUN on 00:09:2D:2C:A2:1B
...
Service Name: Dial-up Networking
Service RecHandle: 0x10007
Service Class ID List:
```


“Dialup Networking” (0x1103)
 Protocol Descriptor List:
 “L2CAP” (0x0100)
 “RFCOMM” (0x0003)
 Channel: 4
 Language Base Attr List:
 code_ISO639: 0x656e
 encoding: 0x6a
 base_offset: 0x100
 Profile Descriptor List:
 “Dialup Networking” (0x1103)
 Version: 0x0100

Pay attention to the first Protocol Descriptor List; you’re interested in the channel it lists. In our example, this tells us that the handset we’re scanning has a dial-up networking service using channel 4. To set up the connection, we bound the tty device to a Bluetooth connection. First, we typed `rfcomm bind rfcomm0 00:09:2D:2C:A2:1B 4` and pressed ENTER. Then we typed `rfcomm`, pressed ENTER, and received the following output:

```
rfcomm0: 00:09:2D:2C:A2:1B channel 4 clean
```

Set Up PPP

With Bluetooth connectivity established, we configured pppd. Create a file called `/etc/ppp/peers/myisp` that contains:

```
/dev/rfcomm0 115200
connect '/usr/sbin/chat -v -f /etc/ppp/chat-myisp'
crtscts
modem
nocrp
defaultroute
noauth
ipcp-accept-remote
ipcp-accept-local
noipdefault
```

Also create a file `/etc/ppp/chat-myisp` with the following content:

```
ATZ OK
ATD*99# CONNECT
```

Finally, we asked the handset to make a connection. We typed `pppd call myisp`



and pressed ENTER. Our screen reported Bluetooth activity, followed by ppp dialing our ISP. With this approach, we didn’t configure any authentication on our computer because our phone took responsibility for relaying our account and password.

This approach is useful for occasional dial-up access. If you frequently find yourself needing dial-up, you can bind to `/dev/rfcomm0` persistently so that your configuration survives across reboots.

In case you want the Bluetooth connection to be handled automatically when it’s needed, be sure to run `rfcomm release rfcomm0` as root. To ensure that `rfcomm0` is always available for telephone connections, add the following to `/etc/bluetooth/rfcomm.conf`:

```
rfcomm0 {
  bind yes;
  device 00:09:2D:2C:A2:1B;
  channel 4;
  comment "ISP connection channel";
}
```

Success!

You should now have the capability of connecting to the ‘Net with your laptop even when there’s no wired infrastructure nearby or a Wi-Fi hotspot in sight. Keep an eye on

your applicable billing rates; a connection like the one described is probably pricey. (Although the fees may still be comparable to many public Wi-Fi access points.) A Bluetooth connection likely resists tampering better than public Wi-Fi, too.

Also, working in this way can free you from dependence on the power grid: If you’re hiking or at a sporting event, you can quickly make a connection to the Internet and retrieve or upload information.

As we already mentioned, the major cellular providers also offer data plans in the United States that can significantly reduce your

costs if you often need wireless connections. In fact, many people now only subscribe to a cellular provider, with no wired line for their voice communications. Because wireless data service providers have become so competitive, some computer users have only a wireless ISP, dispensing entirely with the “wires” common for connecting to the Internet. ▲

by Cameron Laird

Infinite Loop Cell Phone Death

The Institute of Cancer Research and three British universities recently released the results of a study that found that cell phones don’t necessarily raise your risk for developing brain cancer. But don’t take that news as a free pass to start yapping away. England’s Transport Research Laboratory has found

that your reaction time while driving and talking on your cell phone can be impaired by as much as 50%. In some instances, chatting and driving can be more dangerous than driving drunk. ▲



news.bbc.co.uk/2/hi/health/4628914.stm

Chip Firms Accentuate The Positives

For those of you who haven't yet been to Barcelona, Spain, I can recommend it as a fun place to go. There's a tall column standing near the waterfront with a statue of Christopher Columbus on the top, but he's facing east, rather than west.

Maybe AMD is facing east and that's where it got the idea for the codename of the Barcelona chips it's promising will help turn around its fortunes against the mighty Intel.

While AMD is only a 10th the size of Intel, it makes up that shortfall by having a PR rumour mill which is particularly adept at seeding both journalists and partners with high expectations, and it doesn't hesitate to brief, brief, and brief again if it feels that will give it an advantage in the marketplace.

AMD has also wised up to the fact that while it loves its partners to death, they've been known in the past to leak to journalists, so these days it only discloses roadmaps to people who sign their NDAs in blood. (Sometimes we've wondered if Intel roadmaps are so easy to find because they're deliberately leaked. But no, surely not.)

We get the feeling that AMD has tripped itself up with trying to be too clever about Barcelona, though. What is Barcelona? The quad-core will include SSE 128-bit, could offer 64-bit native virtualization, and Apple is so delighted that it's currently designing a unit based on the chip. This, we must stress, is speculation. What we know for sure is that AMD has told the game developer community to work at creating multithreaded code, because by the end of this year we'll have 8-core desktop machines. Let's hope there are apps and games that will use all this raw power.

Even if huge chunks of the AMD rumours are true, I don't believe that the pre hype will have Intel engineers and marketers quaking in their boots. It wasn't that long ago that the CPU firms were telling us floating point didn't matter, 64-bit native virtualization will only appeal to a certain type of user anyway, and if the Apple rumour never comes true it will be

yet another Apple rumour to become the chip equivalent of an urban myth.

What's far more important to AMD during 2007 is that it executes absolutely perfectly on its 65nm production, competes successfully in the current and future price wars against Intel, and doesn't irritate its partners by not being able to deliver what it promises. Because the evidence mounts that AMD, in the wake of its long, long-awaited deal with Dell, has managed to irritate motherboard makers, other OEMs, and the few firms still left that make custom-built AMD-based gaming machines. Perhaps its acquisition of ATI distracted it.

Which brings us back to Intel. While Intel had a very rough time of it in 2005 and 2006, the company now appears to have turned the corner. It claims that it's on target to produce chips using a 45nm process later this year and that it has properly qualified the production. It also continues to churn out dual-core and quad-core processors with price points carefully calculated to both please its partners and make AMD nervous.

In addition, rumours persist that Intel's working on a discrete graphics processor and has made some headway since this time last year, and that it has also several designs slated for point-to-point connection, or CSI (common system interconnect), which are not that far away. Stoutland and Thurley are the code names to conjure with here—cynics might say that linking four Beckton processors to a Boxboro chipset with point-to-point connections isn't particularly new and borrows from AMD. But the same cynics would say AMD's point-to-point was borrowed from the Alpha microprocessor. There's little new under the microprocessor sun.

What does all of this mean to you and me? AMD is not going to go away, although it may assume a different guise, and neither is Intel. Their price wars may hurt them and their partners but for you and me it means faster and more efficient CPUs at lower prices. And we won't be complaining. ▲



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

... rumours persist
that Intel's working on
a discrete graphics
processor and has
made some headway
since this time
last year. ...

Send rumours to "Mad Mike" Magee at mike@cpumag.com.

Games For Windows: The Gauntlet Has Been Dropped

This may come as a shock to some, but Windows is the most popular gaming platform on the planet. Technically this includes all types of games, including the largest segment of the market—casual games—but anyway you slice it, PC gaming is huge and growing.

One of the reasons people don't think about games when they look at a PC is because there has never been a unified go-to-market approach on the content side as there is with consoles. Walking into a retail store you'll see dedicated spaces where console games are displayed in an orderly, branded fashion, whereas PC games are placed in a general PC software section with no common branding. To make things worse, the average shopper doesn't know at a glance if a particular PC game is compatible with his rig.

It's also increasingly attractive for developers to develop on the consoles from a bottom-line standpoint, even with the exorbitant cost of entry. Think about it: Nintendo has sold more Wiis than most PC game titles will sell in total, and game developers are taking notice.

On the other hand, the advantages of making PC games include an open-platform approach to development, the level of realism current PC hardware offers, a low cost of entry, and seemingly limitless performance ceilings. And, of course, online games like World Of Warcraft have created an enviable recurring revenue model which is attracting developers to the PC.

Back in the day, software piracy cast a pall over Windows gaming, but things have changed and piracy has declined significantly. There are still challenges, of course, including endless hardware combinations, insane compatibility tests, and user experience issues. But luckily the pros far outweigh the cons, and now Microsoft is doing all it can to promote PC game development through its Games for Windows program.

So, what's Games for Windows? According to Microsoft, it's a four-tiered promise of quality, compatibility, safety, and ease of use.

Quality: GFW titles undergo extensive testing by both Microsoft and the publisher.

Compatibility: GFW titles work on XP and Vista, whether 32- or 64-bit, and support native widescreen resolutions. One of the biggest prob-

lems with PC games is the extensive configuration required to make a joystick work, and GFW promises to eliminate this complexity by ensuring that titles are compatible with the Microsoft Xbox 360 controller out of the box.

Safety: GFW titles will support new parental controls and unique family settings.

Ease of use: GFW titles are easy to install, find, and remove, especially in Windows Vista. In fact, rumor has it the next-generation Halo will be drop & play from the disc, much as it is on the Xbox 360.

On paper this all sounds great, but I've spoken with many developers who are still on the fence. I've met with the GFW team, and I believe its members are sincere in their efforts, but there are two things that really bug me.

Microsoft is working to create a community experience similar to Xbox Live called Windows Live, where people can chat, set up games, and play. In the future, PC and Xbox 360 gamers will even be able to play with and against each other, a cross-platform experience that sounds really cool to me. My concern is that Microsoft will likely charge a membership fee to be a part of this. So long the fee is \$50 per year or less, it'll probably be a good deal for users, but developers that support the GFW cause may have to give up their recurring revenues to Microsoft.

Another thing that bugs me is the GFW branding. If I were a game developer, I'm not sure that I would want an enormous Microsoft banner on all my games, because it's not like Microsoft published it. I *do* like the concept and agree that consistent branding is important, but Microsoft needs to lighten up on the requirements to attract some of the big guys.

The thought of going home and plopping NHL 2K7 into my PC with an easy-to-use controller experience is awesome. I can't imagine a console being able to keep up with the level of detail that a high-end PC offers: There's nothing like playing games on a PC. I would encourage all developers to take a good, long look at GFW and let them know your concerns. I applaud Microsoft for taking the first step to standardization, now it's your turn to make it work. ▲



Rahul Sood's love for computers started at the young age of 11. Much to the shock and dismay of his parents, he ripped apart his brand-new Apple IIc and painted it red before turning it on. His parent's dreams of having a doctor for a son were shattered when college drop-out Rahul founded what is now one of the most respected high-end computer companies in the world, Voodoo Computers.

... rumor has it
the next-
generation
Halo will be
drop & play
from the disc,
much as it is on
the Xbox 360.

Send your opinions to this opinionated guy at rahul@cpumag.com.

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Technically Speaking

An Interview With Gadi Evron,
Security Evangelist
With Beyond Security

Gadi Evron is a security evangelist with Beyond Security, a leader in the bot-hunting community. He's been involved in IT security since 1996, constantly researching computer vulnerabilities.

by Barry Brenesal



CPU: What are bots?

Evron: The most basic definition would be a Trojan horse. That means it's a piece of software whose users are unaware of its full abilities, and if they knew of these abilities, would not approve of them. If I place a Trojan horse on one computer, I own that computer. I have complete control of it. I can do anything: send emails on it, pop up windows, run applications, etc. But what if I could hack into a larger number of computers? When you do this starting with one Trojan horse, controlling all those computers at once, it's what we call a botnet.

CPU: How large have these botnets grown?

Evron: I have personally seen 350,000 bots linked together. I have read information about one net that was 1.5 million strong; and I have heard that others have seen 3 million. There are so many Trojan horses, so much malware, spyware, and adware that you can hardly throw a stone and reach any computer in the world that

won't have at least one of these malicious applications on them.

CPU: Are you saying that every computer has malicious code running on it?

Evron: I'm saying it's very difficult to find computers that are completely clean. Microsoft released its Security Intelligence Report about the problems its anti-malware products like the Windows Malicious Software Removal Tool found among users. It discovered about 10 million pieces of malware on 4 million computers during the first half of 2006. Roughly 50% of the infections were by bots. If we were to rely on that number alone, we're still dealing with millions of computers.

CPU: How does a bot infect a user's computer?

Evron: There are three main attack channels. The first one is through visiting Web pages. In some cases the user will be fooled into downloading malicious software; whether by somebody saying, 'this is a cool

game,' or 'this is a great application.' Whether they got it from a Web site, a link they found through a search engine, or email, they then download and install it.

Even more insidiously, people embed exploits on Web sites that attack Web browsers. Then when a user enters the Web page, the bot is immediately downloaded and executed on his computer without him ever knowing it. It's important to patch your computer and applications, but that said, there are a lot of unpatched vulnerabilities out there that the developers of Trojans use in order to infect you. It takes a while for Microsoft and other software developers to create patches when these Trojans appear.

CPU: Are there any Web browsers that are more vulnerable than others?

Evron: Internet Explorer. The main issue is that it's a valuable target. Most computers online will go to a Web site using IE. So, if you can find a vulnerability that will attack IE, it's a lot more useful than attacking Firefox. There are more people using

Firefox now, so we're starting to see vulnerabilities in it showing up, but nowhere near as many as there are for IE.

CPU: What are the other two ways a bot could infect a user's computer?

Evron: The second is via email. People should know by now not to open attachments—even from people they know. Email is not secure. Trusting that an email really came from someone you know and running an attachment is no longer a luxury we have. The third most popular way to get infected with a bot is by other computers that are already infected scanning the network trying to find vulnerable systems.

CPU: How is the war going against criminals who create botnets to steal vast sums of money and wreak havoc?

If it's pictures, think twice about whether you really need to download them because you're never really sure what you're actually downloading.

If you go to a new Web site that you haven't gone to before, be careful. As an analogy, consider what you would do if you got a phone call from your bank asking you to verify your identity by providing them with pieces of trivial information such as your mother's maiden name. How do you know that's really the bank? What I would say is, 'OK, before I give you any information, let me call my bank and check with their main switchboard.' You would want to know if it was your bank that had called you, wouldn't you?

So if you get an email from your bank, or from anybody else that requires you to take some sort of action, call the source using a number you have—not one the

a different account. Much like you have control over your computer, if somebody gets malicious code onto it and you're an administrator, they can control anything. You most likely do not need that administrative account for writing documents in Word, answering email, etc.

Update not just your systems, but the applications that you use. If you can, configure your applications so that they do what they need to do, and no more, and serve the exact needs of their users and not go beyond that. Security is based on whitelisting rather than blacklisting.

I would strongly suggest you set your network to filter not only incoming connections but also outgoing connections. If you can see that 500 computers on your network ask to connect at the same time to one computer in the world, either there's a breaking story on CNN or you have a

The war was fought to make the Internet a secure and safe place. That is not possible today.

—Gadi Evron

Evron: We lost that part of the war. The war was fought to make the Internet a secure and safe place. That is not possible today. Much like you can surf the Web and do what you want on it, so can the criminals. There are people out there who make a lot of money out of their operations, and they will stop at nothing to get what they want. What we can do is try to mitigate the risk: contact ISPs, provide them with proof, and have them check these criminal operations and take them offline.

CPU: What can users do to make their computers safer from bots?

Evron: If you receive a link, don't click it. If you want to go to a Web site, type it in or copy the URL.

About attachments, again, if somebody you don't know sends you one, don't open it. Delete it. If you get an attachment from somebody you know, make sure they intended to send it before you open it. If you surf the Web, don't download programs unless they're something like drivers from the people who made your computer.

email provides. Ask them, 'Did you email this to me?' Before you actually follow up on the instructions in an email, offering anything involving personal details, identify your source.

Install antivirus software; it will help make you more secure. And, make sure you update it frequently, if possible, automatically. On that same note, update your operating system regularly.

Install a firewall, or enable the Windows firewall, because that will definitely help protect you.

Get a browser other than IE if you can. In some cases, your Web applications will require IE, so use it only on those occasions. Use Mozilla Firefox or Opera.

CPU: In turn, do you have suggestions for more advanced users?

Evron: Do not use your administrator account except for administrative tasks. Use

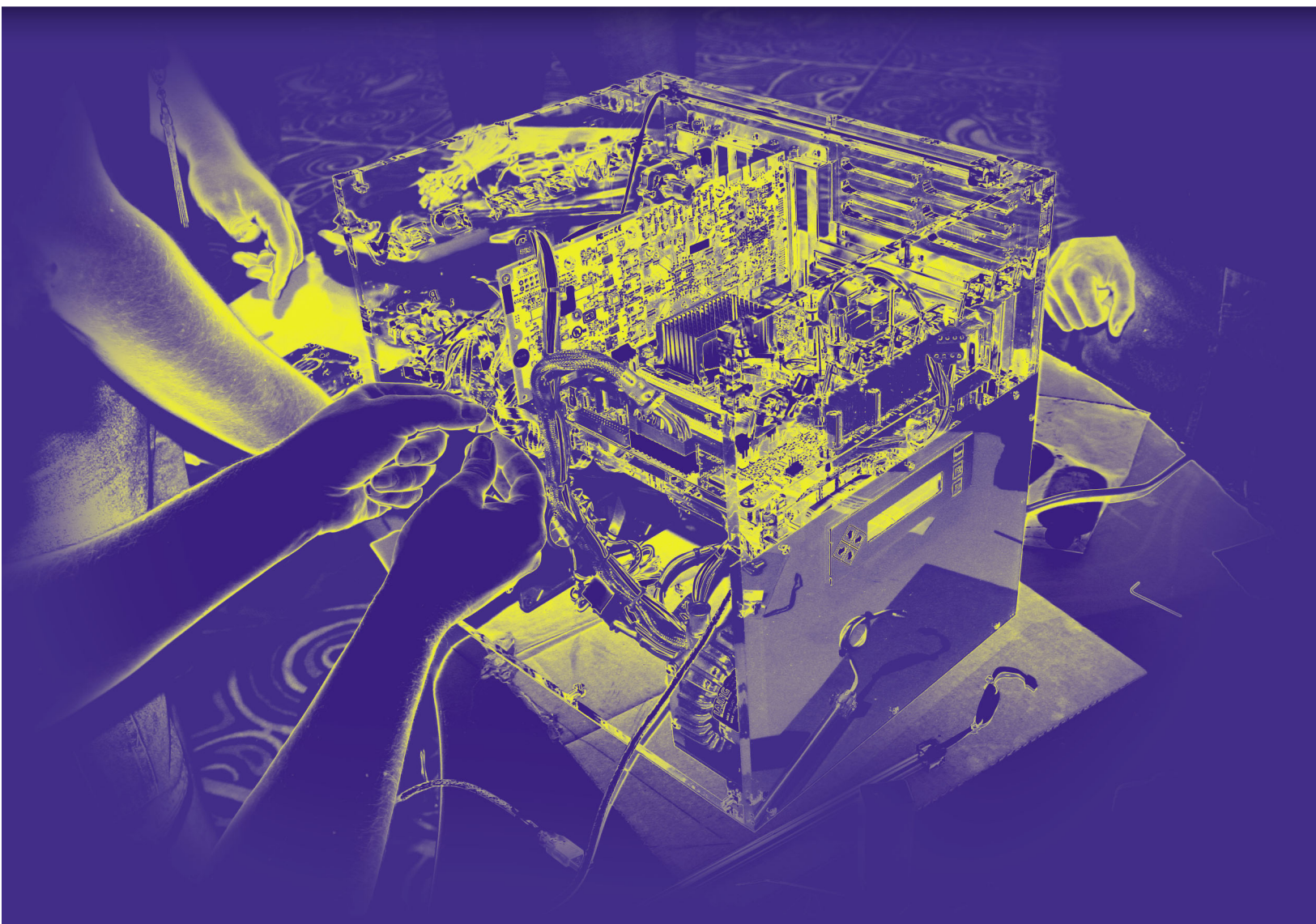
botnet. So monitor your network using NetFlow or a similar application and you'll learn to know what is actually happening on your network.

If you're going to buy software intended to provide security, test it first. There are commercial and open-source tools called fuzzers used in black box testing without any source code or other information needed. You can use fuzz testing to simulate as many hacker attacks as possible to see if it's actually up to scratch on security risks.

Finally, be proactive: Don't just filter out viruses after they've shown up on the Internet, do a vulnerability assessment. Buy a vulnerability scanner or use an open-source one like Nessus. It's something that will give you a very good glimpse into what specific problems need to be addressed on your network. Don't just pay somebody to come along once every six months, do daily or weekly vulnerability assessments of your system. **CPU**



Subscribers can read bonus content with Gadi Evron at www.cpumag.com/cpumay07/evron



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Under Development

A Peek At What's Brewing In The Laboratory

If You Can't Shrink 'Em . . .

For decades, the path to increasing the speed and decreasing the price of electronics has been through continued miniaturization of the logic circuits—creating smaller transistors and cramming more of them on each chip. But within the next 10 years, conventional transistors will reach their physical size limit, bringing Moore's Law to a screeching halt.

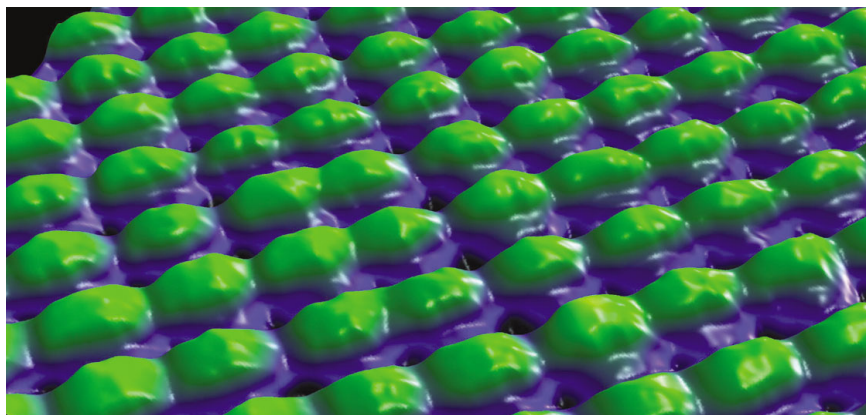
Although other scientists are focusing on developing new chip materials or nanoscale circuits, researchers at HP Laboratories have announced a new design for FPGAs (field-programmable gate arrays) that would use current silicon technology while packing eight times more transistors on a chip than current designs will allow.

In a recently published paper, HP researchers Greg Snider and Stan Williams propose removing the wire interconnects from between transistors, creating a nanoscale crossbar switch structure that would lie on top of them instead. This architecture, called FPNI (field-programmable nanowire interconnect), uses the top mesh layer for power-intensive switching and signal routing, while densely packed transistors below perform the logic operations.

"This way, the transistors are large enough that they stay very reliable," says Williams in a recent press release. "You gain better performance by shrinking the wires instead."

The hybrid chips would be faster while requiring less power and generating less heat; the chips would also be far more tolerant to manufacturing defects in the tiny nanowires. The crossbar interconnects' parallelism would let the chips route around these defects with no significant reduction in chip performance.

Currently, the team has only proven the FPNI architecture through modeling and simulation, but the team is working to produce a lab prototype within the year. If all goes as expected, Williams believes the technology could be ready for wide manufacture by 2010. ▲



HP Labs researchers have created a crossbar switch structure with 17 nanometer wires (about one-third the size of wires used in today's chips) as part of a research project to build vastly more powerful FPGAs. The approach could result in manufacturing yields that are highly defect-tolerant. This atomic force microscope topograph image shows a region that is nearly defect-free. (image: HP Labs)

Fail-Safe GPS

Geocachers in the deep woods and urban travelers alike know the frustration of losing their GPS satellite signal at the least opportune moment, leaving them stumped on which direction to take next. Researchers at Sarnoff Corporation in Princeton, N.J., have developed prototype technology that overcomes this GPS limitation by using information extrapolated from stereo images to fill in satellite coverage gaps.

The system uses four small cameras—two facing forward and two backward—to gather visual information. When the GPS loses the satellite signal, the system calculates location by measuring how far the cameras have moved in relation to fixed objects in the environment. It adds up the movements to determine distance traveled and then corrects for any drift (the result of errors that pile up as the system adds up the movements) that occurs over time by locating landmarks and comparing their location in subsequent frames, a process called visual odometry.

Using this technology, the system has been accurate to within 1 meter, even after going 500 meters without receiving a satellite signal. Previous research has only been able to maintain this level of accuracy over 100 meters, so the Sarnoff team's work represents a significant engineering breakthrough.

In addition to the potential commercial applications in handheld and automotive GPS units, the team's research is in high demand for military applications. In fact, the project is receiving funding from the Office of Naval Research. It may one day allow soldiers with helmet-mounted cameras to navigate in environments where consistent access to a satellite is impossible to maintain.

Although the team's findings have not yet been published, Dr. Rakesh Kumar, one of the scientists working on the project, says that the next steps include diminishing the system's size and reducing CPU cycles required for the intense video processing. He expects that a device based on the technology could be commercially available in four to five years. ▲

Backseat Gaming: It's A Trip

Ah, the joys of family car trips: Either the kids are bored in the backseat, staring out the window and asking the ever-annoying “Are we there yet?”, or their noses are planted in a video game, completely engrossed but missing the scenery and points of interest along the way. What if there was a way you could have both tranquility *and* participation? What if the trip itself could be as much fun as the destination?

This is the experience that John Paul Bichard and his colleagues Liseloot Brunnberg, Anton Gustafsson, and Oskar Juhlin of the Interactive Institute in Stockholm are hoping to enable with their prototype gaming system called Backseat Playground. The system creates an interactive, immersive game based on the players’ real-world location,

incorporating sights and terrain the vehicle passes along the way into the plot and turning passengers into characters in a complex narrative.

Backseat Playground creates the virtual game world with the combination of a GPS receiver, handheld computer, and headphones, all connected to a laptop. The game starts with a breaking news story on the handheld that places the player in the game, such as a murder mystery or sci-fi thriller. Over the course of the game, players receive additional messages and tasks that move the plot along, allowing them to fill the gaps in the story with their own unique experiences of the trip.

Bichard explains that the most significant challenge in developing the system was



Backseat Playground gives passengers the ability to stay entertained and enjoy the ride with an interactive gaming experience.

connecting the game’s plot and events to real-world places, regardless of the direction or duration of the journey.

“This was achieved by using map data as a game object database, predicting the journey ahead, and then comparing forthcoming plot events to interesting geographical features. For instance, in one plot segment, a dead body is found by field operatives. If you are traveling through a golf course, then the body is found in a bunker;

[if you travel] by a [harbor], it’s found under the jetty, . . . and so on. This way the story unfolds but stays relevant to the journey.”

The research team’s next steps include completely testing the user experience over an extended period of time, as well as further refining the tracking technology. Bichard would also like to add voice recognition so that players could talk directly to the game’s characters.

Bichard and his colleagues are exploring commercialization options and hope to bring the game to market in a three-year timeframe. ▲

Interactive Surfaces Pick Up Good Vibrations

Haptic computer interfaces are a hot research area these days. While some scientists are fabricating surfaces with built-in sensors, others, such as those involved in a project called Tai-Chi (Tangible Acoustic Interfaces for Computer-Human Interaction), are taking a different approach. The Tai-Chi team is creating sensors that attach to any surface, turning anything—walls, tables, even 3D objects such as a globe—into a touch-sensitive interface.

The piezoelectric sensors, which measure voltage when mechanical stress is applied, can detect up to two objects at once by sensing surface vibrations through one of two methods. With multiple sensors, the system measures the

difference in the amount of time it takes vibrations to reach each one, working much like sonar. This is the simplest method; it works across large areas and only requires that the sensors be attached. With just one sensor, it detects surface vibrations more precisely but requires proper calibration before it can properly operate.

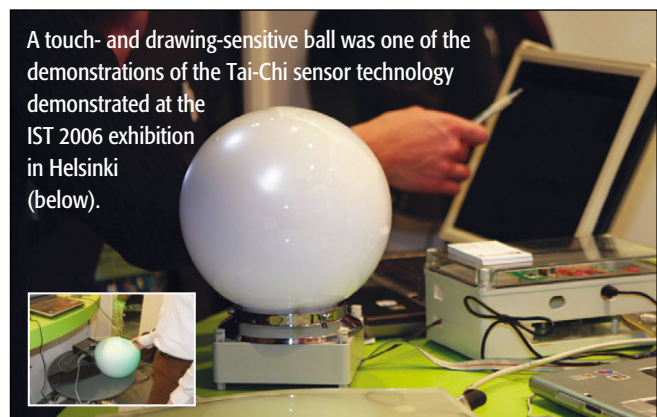
“Theoretically, this technology allows virtually any object’s surfaces to be able to sense touch. Therefore, in practice the biggest challenge is to obtain reliable and precise interaction on a particular material,” explains Dr. Ming Yang, an engineer at Cardiff University who coordinates the project. “Technically, this technology uses the structure of the object itself (2D and

3D) as a transmission channel of information, so it creates a natural, seamless, and unrestricted tangible interface.”

The team has demonstrated the sensors by creating applications such as a virtual piano that plays the correct notes when someone touches a projected key; a large drawing tablet that allows for finger

drawing; and an interactive map that accesses Google Earth images when you touch different map regions.

Yang and her team are currently working to create wireless acoustic sensors, and an already produced Tai-Chi developer’s toolkit should help increase the system’s commercial appeal. ▲



A touch- and drawing-sensitive ball was one of the demonstrations of the Tai-Chi sensor technology demonstrated at the IST 2006 exhibition in Helsinki (below).

Q&A With Nicholas Negroponte

You cannot fix this very quickly by training more teachers and building more schools. But, in the meanwhile, I describe our project as leveraging the children themselves.

Q How are you overcoming skepticism about OLPC?

NN [We're] working very hard. I'm

not sure how to answer this question, but, in the end, One Laptop Per Child speaks for itself. I remind people that children are not a market but a mission for us. I used to spend a great deal of time 'selling' the idea of olpc, lowercase, and then discussing execution, OLPC uppercase. Now I spend no time on olpc because heads of state take it as a given and want to discuss execution. And what a giant step forward that is all in about one year.

Q Why has it taken so long for the computer industry to penetrate school settings in developing countries?

NN For five reasons: One, computers in schools have been used to familiarize kids with IT, so they are treated like tennis courts. Even I do not advocate one tennis court per child. Two, computers have been too expensive. Three, when installed as labs, [computers] are 'government or school property' and don't last long. Four, they need the school to be 'wired' both for electricity and telecommunications. Five, under the above conditions, typically school labs have shown very little value, and the expenditures have been huge.

Q Describe the components for the OLPC laptop and why they were chosen.

NN One, a dual-mode display [because] we feel it is important for kids to play and study outdoors, as well as indoors. Two, low power, in general 2W, is about the limit if you want to use human power. Three, a mesh network for both collaboration and sharing ['Net access']. Four, a camera because kids love it—and they are not office workers. Five, high quality audio processing, again, being for kids. Six, great industrial design—or as cool as possible. A side bar comment to number six: There are two ways to make a low-cost device. One is cheap components, plus cheap labor, plus cheap design equals a cheap device. The other is large scale integration, advanced manufacturing, large numbers, and great design equals a low-cost laptop. We are working to achieve the latter.

Q What else has to happen, beyond getting these laptops to children, in order for more development to occur?

NN One Laptop Per Child is triggered by a 'launch,' which is defined as a commitment for 3 million to 5 million laptops. That causes the supply chain to start and the process goes from there. We have said we will not launch until at least three countries in two continents are committed. My hope is that six to nine countries will be part of it.

Q Of the companies working with you on the OLPC project, which are really stepping up to help out?

NN This is episodic and circumstantial. When we started engineering on the display, for example, Chi Mei threw many engineers at the problem. Quanta man power surges during a build. Red Hat has consistently the largest internal team. AMD is constantly involved. News Corp and Google step up to the plate when we are being bullied. ▲

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Nicholas Negroponte has been a staple of the technology industry for decades as the co-founder of the MIT Media Laboratory. He was a columnist for *Wired* magazine and wrote "Being Digital." Currently, Negroponte serves on the board of Motorola and is involved with one of the biggest startups of his career—the OLPC (One Laptop Per Child) project. As Chairman Emeritus at the Media Lab, Negroponte can dedicate himself full time to the nonprofit project, which aims to provide XO laptops to children worldwide, especially children in developing nations. Negroponte helped start the OLPC project in 2004 with other Media Lab colleagues and today it has grown into a project that the United Nations sponsors and has received \$29 million in funding from companies such as Red Hat, Google, and News Corp.

Q Describe the One Laptop Per Child project.

NN The elimination of poverty through enabling primary education where it is weak or does not exist. If you look at the 1.2 billion children [approximately; generally referring to the number of school-age children in developing nations], about 50% are rural and without electricity, and in some cases with only a tree for school. In some cases, teachers do not show up.

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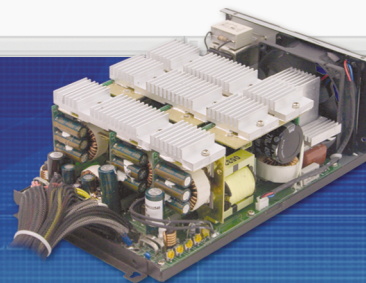
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